











U. S. DEPARTMENT OF COMMERCE  
BUREAU OF FISHERIES

---

REPORT  
OF THE  
UNITED STATES  
COMMISSIONER OF FISHERIES  
FOR THE FISCAL YEAR 1934  
WITH  
APPENDIXES

---

FRANK T. BELL  
Commissioner



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1936

## NOTE

---

The first section of this volume, entitled "Bureau of Fisheries", constitutes what was known in years prior to 1933 as "Report of the Commissioner of Fisheries." Since then, in the interests of economy, it is a reprint from the "Annual Report of the Secretary of Commerce." The pagination, therefore, is the same as that of the Secretary's Report, rather than beginning with page i.

## ERRATA

---

Page 58: The catch of lobsters in Connecticut should be *598,809 pounds* instead of *589,809 pounds*.

Page 108: First section of table at top of page, *Sea robin* should be *Sea bass* and *Tautog* should be *Swordfish*.

Page 188: In the table "Catch off Latin America" the Total and Grand total under "Lines, set and hand" should be *15,707,777 pounds* instead of *5,707,777 pounds*.



## CONTENTS

	Page
BUREAU OF FISHERIES. By Frank T. Bell. (Issued Feb. 26, 1935.) (See Note on p. ii) -----	77-101
FISHERY INDUSTRIES OF THE UNITED STATES, 1933. By R. H. Fiedler, John Ruel Manning, and F. F. Johnson. Appendix I. (Issued Aug. 17, 1934) -----	1-237
ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1933. By Ward T. Bower. Appendix II. (Issued Nov. 14, 1934) -----	239-312
PROGRESS IN BIOLOGICAL INQUIRIES, 1933. By Elmer Higgins. Appendix III. (Issued Sept. 26, 1934) -----	313-383
PROPAGATION AND DISTRIBUTION OF FOOD FISHES, 1934. By Glen C. Leach and M. C. James. Appendix IV. (Issued June 7, 1935) -----	385-417



## U. S. DEPARTMENT OF COMMERCE

### BUREAU OF FISHERIES

---

HEADQUARTERS STAFF, 1933-34

---

*Commissioner*

FRANK T. BELL

*Deputy Commissioner.*—CHARLES E. JACKSON.

*Chief Clerk.*—FLOSSIE WHITE.

*Chiefs of Divisions:*

*Fish Culture.*—GLEN C. LEACH.

*Inquiry Respecting Food Fishes.*—ELMER HIGGINS.

*Fishery Industries.*—R. H. FIEDLER.

*Alaska Service.*—WARD T. BOWER.

*Black Bass and Anglers.*—TALBOTT DENMEAD.

*Director of Aquarium.*—FRED G. ORSINGER.

*Editor.*—CLIFFORD F. MAYNE.

*Librarian.*—LOUISE BEITZELL.

*Publications.*—BARBARA ALLER.



## **BUREAU OF FISHERIES**

---

The fishing industry, in common with most other industries, has suffered severely during the past few years. The fiscal year 1934 has shown, at least in many of the important producing centers, a tendency toward recovery. Better prices have prevailed during most of the months of the year, and these better prices have been accompanied by increased catches. While still far below normal, the upward trend is very encouraging.

The fisheries of the United States and Alaska, which are prosecuted on the high seas and in the territorial waters of the Atlantic and Pacific Oceans and in the Gulf of Mexico and their adjacent waters, as well as in the Great Lakes and in interior waters in 1932, the latest calendar year for which complete data are available, gave employment to about 116,000 persons as commercial fishermen, and their catch in the same year aggregated 2,614,000,000 pounds, valued at \$54,800,000 to the fishermen, representing a decrease of 1 percent in quantity and 29 percent in value as compared with the catch and its value in the preceding year.

There were decreases in most of the groups of prepared products; thus the output of canned fishery products which amounted to 416,062,000 pounds, valued at \$43,749,000, showed a decrease of 18 percent in quantity and 31 percent in value as compared with the previous year. Byproducts valued at \$12,466,000 decreased 25 percent in value, and frozen products, which amounted to 92,472,000 pounds and estimated to be valued at \$7,000,000, decreased 18 percent in volume. The production of fresh and frozen packaged fish (not including shellfish) in the calendar year 1932 amounted to 51,976,000 pounds, valued at \$5,741,000. Data on the output of cured fishery products were not collected for the year 1932, but in 1931 the production amounted to 98,969,000 pounds, valued at \$12,364,000.

Imports of fishery products for consumption in the calendar year 1932 were valued at \$29,566,000, which is 31 percent less than in the previous year, while exports of domestic fishery products were valued at \$7,808,000, or 33 percent less than in 1931.

### **NATIONAL PLANNING COUNCIL (OF COMMERCIAL AND GAME FISH COMMISSIONERS)**

For many years, in fact ever since the inception of fishery work, there has been a lack of coordination between the various organizations engaged in this service. The Federal Government and the various States have all pursued their respective ways. They have cooperated it is true, but in a sort of haphazard way, uniting on projects that concerned them both for the time being.

This haphazard method was especially noticeable in the fish planting efforts of the various agencies and resulted in considerable waste of fish, effort, and money. Requests for fish were received by both the State and Federal departments and were filled by the agency receiving the request, without regard to what had been done or was going to be done by the other agency concerned. The results were that often the two agencies planted different species of fish in the same waters and these different species might be antagonistic to each other. In the actual planting of these fish more time and money have been spent than necessary. The Federal Government has sent its trucks to waters that could have been better and more cheaply served by the State and vice versa.

With the advent of pollution problems, stream-survey work, and stream-improvement programs, the need for coordination of effort became even more apparent. Rivers know no State lines, nor do the fish in them. The work to be successful must embrace river systems regardless of State boundaries. This, then, would require careful planning and direction.

Commissioner Bell, therefore, called a meeting of State game and fish officials in St. Louis on April 23, 1934, and laid before them a plan to coordinate the activities of the various States and the Federal Government in all their activities concerning fish. This led to the formation of the National Planning Council of Commercial and Game Fish Commissioners. Through this council it is expected to establish unified programs that will bring about a saving in money and yet actually accomplish more for the fisheries than under the old system.

The council divided the country into five zones, grouping together those States with similar problems and conditions. Each zone will hold meetings every 3 months or oftener to consider the problems of that zone, and the whole council will meet once a year for general consideration of the whole situation.

#### COOPERATION WITH STATES

Many of the cooperative relationships for fish culture are a continuation of those existing in previous years. Among the newer developments is an arrangement whereby the Bureau's Northville (Mich.) station incubated trout for assignment to the States of Indiana and Ohio in conformity with the program of those States to develop trout fishing. Upon the closure of the Federal hatchery at Grand Lake Stream, Maine, the State Fish and Game Department was prevailed upon to take over its operation and allot the Bureau a limited number of land-locked salmon eggs. The resources of the State and Federal hatcheries, located at Put in Bay, Ohio, were pooled, with the result that the operations with whitefish and with pike perch were conducted at a material saving to both agencies. The State of Georgia undertook to distribute fish from the Bureau's Lake Park station, filling both State and Federal applications. At Rochester, N. Y., the cooperative arrangement with the city and the Monroe County Park Board was continued, and there was placed in operation a first-class trout hatchery, the activities of which were supervised by the Bureau, while the costs of construction were met by



the local community. At Wallhalla, S. C., the unified efforts of the Bureau, local sportsmen, and the authorities in charge of the Civilian Conservation Corps activities resulted in the establishment of splendid rearing ponds, in which a considerable number of trout for local waters are being grown.

The maintenance of cooperative rearing ponds by private sportsmen's organizations to be stocked with fish furnished from Federal hatcheries has been conducted on a somewhat restricted scale. The Bureau will continue to cooperate with such groups who are desirous of accepting part of the responsibility for the production of larger fish for stocking their local waters. More careful scrutiny must be given, however, to the locations available, the resources of the organization, and other pertinent details in view of the more limited scope of the Bureau's activities.

Cooperative investigations of the nutritional requirements of trout carried on jointly by the New York Conservation Department, Cornell University, and the Bureau of Fisheries at Cortland, N. Y., have been continued during the past year, and a series of monthly articles concerning modern hatchery practices has been issued for the use of fish culturists.

Cooperative trout investigations in the State of California, because of the liberal support afforded by that State, have been conducted without curtailment. Ecological studies of both coastal and high Sierran streams have been undertaken on a large scale to determine the capacity of various waters in sustaining fish life in relation to the food supply. Three stream-survey parties were maintained in the field during the past summer on Public Works Administration funds, and great progress has been made in obtaining the necessary facts upon which to base more adequate stocking policies for the waters of this State.

In the technological work of the Bureau many State agencies have cooperated in extending their facilities for the prosecution of these studies. State universities, hospitals, agricultural experiment stations, and other State institutions of research have contributed personnel and laboratories in various projects. Especially has this been true in the nutrition studies. Among the State institutions cooperating in this work are the South Carolina Food Research Commission and State Medical College, Charleston, S. C.; the Massachusetts State Agricultural College, Amherst, Mass.; the Ohio State Agricultural Experiment Station, Wooster, Ohio; the New York State College of Agriculture, Cornell University, Ithaca, N. Y.; Washington State College and Agricultural Experiment Station, Pullman, Wash.; the University of Washington, Seattle, Wash.; and the University of Maryland, College Park, Md. In addition to cooperation in nutrition investigations, the members of the staff of the Massachusetts State College rendered valuable aid to the technological staff of the Bureau's laboratory at Gloucester, Mass. In tests of fishing gear with respect to measurement of mesh size of nets, cooperation has been received from the States bordering on the Great Lakes.

In certain marketing investigations, including the studies of the grading of fish, the States of Virginia, North Carolina, Massachusetts, Maryland, and New Jersey either cooperated actively or gave valuable aid in some form.

In the annual surveys of the fisheries of the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from State fishery agencies in recent years that it has been only necessary for agents of the Bureau to conduct fragmentary surveys to supplement the data available. Recently the States of Maryland and Virginia have adopted very complete statistical programs which not only alleviate the work of our agents but also produce more accurate data.

#### COOPERATION WITH OTHER FEDERAL AGENCIES

The coordinating bill, passed during the last session of Congress, calls upon Government Bureaus whose activities affect wildlife, including the Bureau of Reclamation and the Bureau of Indian Affairs, to consult with the Bureau of Fisheries and/or the Bureau of Biological Survey whenever wildlife may be affected by activities of the two former organizations.

In response to this legislation, the Bureau of Reclamation of the Department of Interior has just issued general instructions to its field officers which provide that storage areas for irrigation or power shall be administered as far as possible to avoid detriment to fish and birds, and that when ponded waters are to be lowered to a point adversely affecting fish and game, officials in charge shall notify State and Federal authorities in charge of the protection of fish and game in advance.

The Bureau of Biological Survey has administered its land-purchasing program in the Upper Mississippi Refuge so as to afford assistance to the Bureau's activities. In this purchasing program the Biological Survey has endeavored to meet the wishes of the Bureau by acquiring tracts within the refuge which can be used for fish-cultural purposes. In the case of the National Park Service, aside from strictly fish-cultural work in stocking park waters, the Bureau has been requested to give further assistance by conducting a survey of the waters of the Great Smoky Mountain National Park, to develop information as to food conditions, suitability of different species, stocking policies, etc., in that area similar to the data being worked out in the western parks.

With funds received from the War Department, Corps of Engineers, to carry on the cooperative investigation at Bonneville on the Columbia River, studies are being made as to how the fish should be passed over the dam, both as mature upstream migrants and young downstream migrants. The problem is the most difficult one of its kind yet encountered since the use of devices used successfully at other dams has not been found entirely applicable at Bonneville because of the much greater height of the dam.

The Bureau also receives extremely valuable cooperation from the Engineer Corps in its studies of pollution in the Mississippi River system. In this work a floating laboratory is used, set up in a former Engineers' quarterboat. During the summer working season for several years past this boat has been moved from place to place by the Engineers' river tugs.

The Bureau of Agricultural Economics collects information on cold-storage holdings of fish in the United States. The Bureau of

Fisheries supplies that Bureau with vital economic information. In the collection of statistical data, the cooperation of the Bureau of the Census, the Bureau of Foreign and Domestic Commerce, the United States Tariff Commission, and others is of considerable value to this Bureau.

In the technological field the Bureau has worked from time to time in cooperation with practically every scientific or technical agency of the Federal Government. One example of this is the cooperation with the Navy Department in developing chemical preservatives for marine rope and cordage. Other examples are the cooperation with the Bureaus of Animal Industry, Dairy Industry, Biological Survey, Plant Industry, Food and Drug Administration, and Chemistry and Soils in extending the uses of fishery products in human, animal, and plant nutrition.

During 1933, various new and emergency agencies of the Federal Government made considerable use of the facilities of the Division of Fishery Industries, including its technical, marketing, and statistical reports and the knowledge and experience of its personnel. Such cooperation was rendered to the National Recovery Administration, the Agricultural Adjustment Administration, the Federal Emergency Relief Administration, the Federal Surplus Relief Corporation, the Reconstruction Finance Corporation, and others. Members of the Bureau's staff were detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to supervise and assist in the formulation of fishery codes of fair competition under the National Industrial Recovery Act.

#### CONSERVATION OF WHALES

The Multilateral Convention for the Regulation of Whaling agreed to by the economic committee of the Council of the League of Nations on September 24, 1931, yet awaits the signature of the United Kingdom of Great Britain and Northern Ireland to make the convention effective. The convention has been ratified by the following nations: United States, July 7, 1932; Norway, July 18, 1932; Union of South Africa, January 11, 1933; Switzerland, February 16, 1933; and Mexico, March 13, 1933. In addition to these ratifications, the following have signified adherence to the convention: Nicaragua on April 30, 1932; Sudan, April 13, 1932; Monaco, June 17, 1932; Brazil, November 21, 1932; and Egypt, January 25, 1933.

#### LEGISLATION

Several pieces of legislation affecting fishery matters and the Bureau of Fisheries were enacted during the last session of the Seventy-third Congress. A brief statement with respect to the more important legislation enacted follows:

Public, No. 166, approved April 16, 1934, amends sections 3 and 4 of an act of Congress entitled "An act for the protection and regulation of the fisheries of Alaska", approved June 26, 1906, as amended by the act of Congress approved June 6, 1924. The effect of these amendments is to permit commercial fishing for king salmon in the

Yukon and Kuskokwim Rivers by native Indians and bona fide white inhabitants under such restrictions as may be prescribed by the Secretary of Commerce. Heretofore all commercial fishing has been prohibited in these rivers and within 500 yards of their mouths.

Public, No. 372, approved June 16, 1934, repeals all acts and parts of acts making it unlawful to kill sea lions in the waters of the Territory of Alaska, and in substance provides that sea lions may be killed in the waters of Alaska only in accordance with rules and regulations prescribed by the Secretary of Commerce. The regulations which have been promulgated pursuant to the provisions of this act provide that sea lions may be killed by natives for food or clothing, by miners or explorers when in need of food, or by anyone in the necessary protection of property, or while such animals are destroying salmon and other food fish.

Public, No. 447, approved June 21, 1934, authorizes an appropriation of \$500,000 for the preparation of plans, specifications, and for the construction and equipment of a fisheries research vessel to be maintained and operated under the supervision of the Secretary of Commerce. No appropriation, however, has as yet been made.

Public, No. 464, approved June 25, 1934, authorizes the formation of associations of producers of aquatic products. This act extends to the producers of aquatic products the same privileges which have been extended to producers of agricultural products by the act of February 18, 1922 (42 Stat. 388). In other words, it permits the producers of aquatic products to form associations for the purpose of collectively producing, marketing, and harvesting aquatic products.

Public Resolution No. 19, approved April 16, 1934, extends to the whaling and fishing industries the same benefits granted under section 11 of the Merchant Marine Act of 1920, as amended. This act provides for loans for the construction, outfitting, equipment, reconditioning, remodeling, and improvement of vessels engaged in the whaling and fishing industries and is administered by the United States Shipping Board Bureau.

Public, No. 120, approved March 10, 1934, provides for the establishment of fish and game sanctuaries, subject to certain restrictions and limitations, and provides that the Secretaries of Agriculture and Commerce shall execute the provisions of the act, and authorizes them to make all needful rules and regulations for the administration of such fish and game sanctuaries or refuges as may be established pursuant to the provisions of the act.

Public, No. 121, approved March 10, 1934, commonly known as the "Federal Coordination Act", has for its purpose the conservation of wildlife—fish and game.

Public, No. 417, approved June 19, 1934, provides for loans for the purpose of financing the production, storage, handling, packing, processing, carrying, and/or orderly marketing of fish of American fisheries and/or products thereof. This act is being administered by the Reconstruction Finance Corporation.

Public, No. 381, approved June 18, 1934, authorizes production credit associations to make loans to oyster planters. This act is being administered by the Farm Credit Administration.

## CONSTRUCTION ACTIVITIES

Construction and improvements at the Federal hatcheries were conducted through the medium of allotments received from the Public Works Administration and through participation in the Civil Works program during the winter. During the year there became available outright allotments totaling \$281,500. These grants from the Emergency Public Works funds provided \$150,000 for additional construction at five hatcheries which were only partially completed. These hatcheries, authorized by the act of May 21, 1930 (46 Stat. 371), are located in Alabama, Indiana, Pennsylvania, Texas, and West Virginia. At the close of the year all of these hatcheries had been placed on a producing basis, although several of them were not fully completed. The balance of the allotments, amounting to \$131,500 was apportioned among 29 different hatcheries for the purpose of reconditioning and repairs. On the inception of the Civil Works program in November, there was approved a grant of a maximum of 2,440 men with an allotment of \$85,175 for materials and expenses other than labor. These forces were assigned to projects of improvement, enlargement, and reconditioning at 40 different hatcheries, and rearing units. The maximum number of men employed at any one time was 2,269. By virtue of the outright cash allotments, and the allocation of labor, the hatchery system as regards buildings, water supply, and all physical features was brought to a higher state of repair and efficiency than has existed for a great many years.

## STATISTICAL INVESTIGATIONS

## FISHERIES OF THE UNITED STATES, 1932

*New England States.*—During the calendar year 1932 the commercial fisheries of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut employed 16,580 fishermen. Their catch amounted to 480,521,000 pounds, valued at \$14,001,000—a decrease of 10 percent in volume and 28 percent in value as compared with the catch in 1931. In addition there was a production of 229,000 bushels of seed oysters, valued at \$120,000. Landings of fish by American fishing vessels at Boston and Gloucester, Mass., and Portland, Maine, amounted to 252,334,000 pounds as landed, valued at \$6,084,000—a decrease of 4 percent in quantity and 34 percent in value as compared with the preceding year.

*Middle Atlantic States.*—The commercial fisheries of New York, New Jersey, Pennsylvania, and Delaware in 1932 gave employment to 9,155 fishermen. Their catch amounted to 141,221,000 pounds, valued at \$4,654,000—a decrease of 7 percent in volume and 36 percent in value as compared with 1931. In addition, there was a production of 1,332,000 bushels of seed oysters, valued at \$481,000. Landings of fish at New York City and Groton, Conn., amounted to 35,602,000 pounds or 31 percent less than in 1931. On the Hudson River the shad fishery was conducted by 274 fishermen who caught 530,000 pounds of shad valued at \$51,000—an increase of 28 percent in volume and 2 percent in value over 1931.

*Chesapeake Bay States.*—In the calendar year 1932 the commercial fisheries of Maryland and Virginia employed 21,084 fishermen. Their catch amounted to 359,007,000 pounds, valued at \$5,905,000—an increase of 26 percent in volume, but a decrease of 18 percent in value as compared with the previous year. In addition there was a production of 1,475,000 bushels of seed oysters, valued at \$159,000. The shad and alewife fisheries of the Potomac River were prosecuted by 703 fishermen who caught 2,264,000 pounds of shad, valued at \$173,000 and 6,845,000 pounds of alewives, valued at \$24,000, representing an increase of 10 percent in the catch of shad, but a decrease of 7 percent in the catch of alewives.

*South Atlantic and Gulf States.*—During the calendar year 1932 the commercial fisheries of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas employed 21,560 fishermen. Their catch amounted to 299,917,000 pounds, valued at \$6,428,000—an increase of 4 percent in volume, but a decrease of 20 percent in value as compared with the previous year. In addition, there was a production of 40,000 bushels of seed oysters valued at \$8,000.

*Pacific Coast States.*—The commercial fisheries of Washington, Oregon, and California in the calendar year 1932 employed 17,900 fishermen. Their catch amounted to 560,828,000 pounds, valued at \$9,484,000—a decrease of 6 percent in quantity and 30 percent in value as compared with 1931. The total catch of halibut by the United States and Canadian vessels amounted to 43,458,000 pounds, valued at \$1,740,000—an increase of 1 percent in quantity, but a decrease of 39 percent in value as compared with the preceding year.

*Lake States.*—During the calendar year 1932 the Lake fisheries (Lakes Ontario, Erie, Huron, Michigan, and Superior, and Namakan and Rainy Lakes, and Lake of the Woods of the United States and Canada) produced 110,675,000 pounds of fishery products. Of the total, the United States accounted for 83,744,000 pounds, valued at \$4,332,000—a decrease of 9 percent in quantity and 28 percent in value as compared with the United States catch in the previous year. The Lake fisheries in the United States gave employment to 6,900 fishermen in 1932.

*Mississippi River and tributaries.*—No survey was made of the fisheries of the Mississippi River and tributaries for the year 1932. In 1931 these fisheries gave employment to 15,900 fishermen, and their catch amounted to 82,382,000 pounds, valued at \$2,897,000.

#### MANUFACTURED PRODUCTS IN THE UNITED STATES AND ALASKA, 1932

*Fresh and frozen packaged fish.*—The production of fresh and frozen packaged fish in the calendar year 1932 amounted to 51,976,000 pounds, valued at \$5,741,000. The most important species packaged was haddock, which alone amounted to 33,401,000 pounds, valued at \$3,357,000. Statistics of production of fresh and frozen packaged shellfish were not obtained for 1932.

*Frozen products.*—The production of frozen fishery products in 1932 amounted to 92,472,000 pounds, estimated to be valued at about \$7,000,000. The volume of the production was 18 percent less than in 1931. The more important products frozen with respect to volume were mackerel, ground fish, salmon, whiting, and shellfish.

*Cured products.*—Statistics of the production of cured fishery products were not obtained for the year 1932, but in 1931 the output amounted to 98,969,000 pounds, valued at \$12,364,000.

*Canned products.*—Canned fishery products produced in 1932 amounted to 416,062,000 pounds, valued at \$43,749,000—a decrease of 18 percent in quantity and 31 percent in value as compared with 1931. Canned salmon amounted to 283,631,000 pounds, valued at \$26,460,000; other important products were tuna and tunalike fishes, sardines, shrimp, clam products, and oysters.

*Byproducts.*—During the calendar year 1931 the value of production of fishery byproducts amounted to \$12,466,000—a decrease of 25 percent as compared with the preceding year. Important products in this group were marine animal oils and meals and aquatic shell products.

#### MARKETING INVESTIGATIONS

*The shrimp industry.*—A survey of the shrimp industry of the South Atlantic and Gulf States, which in 1932 produced 96,000,000 pounds, valued at \$2,700,000 to the fishermen, points out the advisability of study of conservation measures, technological development, and improved business methods, and includes much data on the economic aspects of this industry.

*Standardization or grading fish and fishery products.*—At the request of various States, members of the industry, and others interested in the fisheries, the Bureau has continued its study of the possibilities for establishing and applying voluntary marketing grades or standards for fishery products.

#### TECHNOLOGICAL INVESTIGATIONS

Technological investigations include studies of methods of manufacture, preservation, storage, and marketing of both the primary products of the fisheries for food and the byproducts for animal nutrition; biochemical tests to determine the food value of these products; the development of fishing gear; and experiments in preparing chemical treatments to fishing nets to lengthen their usefulness. These investigations have involved the application of the sciences of chemistry, engineering, bacteriology, and general technology to the solution of the problems arising. The accomplishments of the Bureau's technological staff, during recent years, have resulted in notable contributions of outstanding value to both American fisheries and American agriculture. Among these achievements is the discovery of ample domestic sources of vitamin-bearing fish oils for both human and animal nutrition. These fish oils, rich in vitamins, such as halibut liver, cod liver, swordfish liver, sardine, salmon, and many others, are absolutely essential to the maintenance of a high standard of nutrition among our people and are of economic necessity to the American farmer in raising further food for our national dietary. Other accomplishments during the past year by the technological staff of direct economic value to the fishery industries are the development of chemical preservatives for lengthening the useful life of fishing nets and gear, the discovery of important facts concerning the peculiarly valuable food properties of fishery products as one of our great

basic food industries, the development of better methods for manufacturing fish meal for use by the agricultural industry, and the discovery of better methods for the preservation and handling of various products of the fisheries.

*Preservation of fishery products for food.*—These studies have consisted of the development of improved methods for handling fresh and frozen fish, improvements in the smoking of fish, methods of canning fish in the home, and the bacteriology of fish preservation and storage. Technologists of the Bureau have developed an electrometric method for the determination of the relative freshness of fish flesh. They have found that, in order to produce smoked fish of uniformly high quality, the factors affecting the quality of smoked fish, such as temperature, humidity, volume of smoke, etc., must be controlled. Finnan haddie of uniformly high quality were produced experimentally. Methods of home canning fish are being worked out. The changes caused by the action of bacteria are closely related to the chemical changes which accompany enzyme action in the fish flesh. Attempts are being made to correlate the various stages of spoilage with the bacteria count in each of these stages. This has included studies of the bacteriology of the various experimental methods of fish preservation described above.

*Preservation of fishery byproducts.*—Studies on the improved manufacture of fishmeal from nonoily fish waste demonstrated that by careful control of drier operation this type of material can be converted into a very high-grade meal by a single drying operation, without experiencing appreciable difficulty from glue formation. Material so produced has a particular advantage as a feedstuff in that it possesses considerable vitamin G potency. The effect of drying time and temperature of drying on various factors influencing the nutritive value of fishmeal was determined and additional information was obtained on the relative importance of such factors.

Data obtained from the examination of a large number of haddock-liver oil samples indicated that oil prepared from livers taken from fish caught during the summer months, especially on Georges Bank, will occasionally have an iodine number which will exceed the maximum upper limit prescribed for cod-liver oil in the United States Pharmacopoeia.

At the present time, large quantities of salmon waste are not being utilized. This material is capable of yielding an oil comparable to cod-liver oil in vitamins A and D, and a fishmeal of high feeding value. In order to assist in increasing the utilization of salmon waste and to improve the product now manufactured, technologists were assigned to the Pacific coast to conduct research on this problem. The results to date, while only of a preliminary nature, indicate the possibility of considerable improvement in the waste-utilization problem of the salmon fishery.

Studies on the oil extractable from the livers of swordfish taken off the New England coast show that this oil is an even richer source of vitamins A and D than halibut-liver oil. This is an extremely important discovery.

One method of increasing the usefulness of fish oils is to increase their keeping qualities. Studies are being carried on with the use of antioxidants or inhibitors for the purpose of preventing excessive oxidation and rancidity.



*Nutritive value of fishery products.*—It has been found that a diet of oysters and milk not only permits normal blood formation but also good growth, reproduction, and lactation in laboratory animals. Experiments in which white rats have received diets for a period of 12 months which are many times richer in copper than any oysters found on the market reveal that when the element is fed in conjunction with oysters a smaller quantity of the metal is stored in the liver than when fed with the stock diet alone. The toxicity of the copper contained in market oysters should, therefore, give very little concern.

Other nutrition studies have revealed the relatively high vitamin content of various fish oils, such as swordfish-liver oil, oils from salmon cannery trimmings, salmon eggs, salmon livers, and other miscellaneous fish oils.

*Development and improvements of fishing gear.*—The mesh size of nets determines the kinds and numbers of undersized and immature fish which will be permitted to escape from the commercial fishermen in the interests of conservation. Technologists of this Bureau and of the Bureau of Standards have made a study of devices to enable the conservation authorities of the States to establish and apply uniform enforcement of regulations pertaining to the mesh sizes of nets.

For many years methods have been studied for chemically treating nets in order to prolong their useful life. In addition to recommendations for treating these nets with toxic dyes as suggested in previous annual reports, it has been found, during the past year, that chrome tanning of the cotton netting gives excellent results and that, where bacterial action on nets is not serious, an improved method of cutting twine produces good service. In all cases, better results are obtained by covering the treated nets, in addition to one of the above treatments, with a good grade of tar, properly applied. Mercury compounds are valuable in checking weed and other marine growths on nets exposed in waters for varying lengths of time.

#### BIOLOGICAL FISHERY INVESTIGATIONS

Reduced appropriations made it necessary to curtail drastically scientific investigations on the main problems of the national fisheries. In spite of a smaller staff, diminished laboratory facilities, and lowered operating funds, a reorganization made it possible to carry on the most essential lines of research. Funds furnished by the Public Works Administration enabled the undertaking of important lines of investigation which had previously received little attention.

Investigations of the commercial fisheries are concerned with the changes in abundance of the food fishes of the North and Middle Atlantic areas and with the correction of abuses in the commercial fisheries of the Great Lakes. The shrimp fishery of the South Atlantic and Gulf has also been studied with the aim of discovering and preventing depletion of the supply; and the salmon and herring fisheries of Alaska are undergoing scientific analysis as a basis for their regulation. Aquicultural investigations include studies on the improvement of hatchery technique for both cold- and warm-water fishes and the planning of rational stocking policies in interior

waters. Shellfishery investigations have been directed toward improving the quality of the oysters in the North and Middle Atlantic section and toward increasing the production by cultural methods in the South and on the Pacific coast.

With funds received from the Public Works and Civil Works Administrations studies were made on fresh- and salt-water pollution; the formation of a rational stocking policy for our national parks and forests was undertaken, as well as studies of fish protective devices to be used in connection with certain physical developments along the important fishing rivers.

#### FISHERY INVESTIGATIONS OF THE ATLANTIC AND GULF STATES

The haddock catch, which has been declining steadily since the peak year of 1929, showed signs of recovery in 1933 when the total landings at major fishing ports reached 138,000,000 pounds. This was about equal to the catch in 1932 but far short of the 243,000,000 pounds landed in 1929. The termination of the downward trend came largely as the result of the improved fishery on the banks off the Nova Scotian coast, which approximately counterbalanced a moderate decline on Georges Bank and South Channel. On the latter banks, which normally supply the major part of our haddock catch, the abundance of marketable haddock during the spring and summer of 1933 was considerably less than during the corresponding part of the previous year, but in the fall and winter was raised by the influx into the commercial catch of fish of the 1931 class which then were reaching marketable size. However, the average level for the entire year was considerably less than in 1932 and was primarily responsible for the decline in the catch from this area. On the banks off the Nova Scotian coast haddock of the relatively numerous 1929-year class reached marketable size in the summer and fall of 1933 and caused a great increase in the catch. This was the same year group which caused the improved catch on Georges Bank in 1932, but due to the difference in growth rate the haddock of this class did not reach commercial size on the Nova Scotian banks until more than a year later.

The prospects are good for a somewhat improved yield in 1934. The average abundance on Georges Bank should be about the same or possibly somewhat less than in 1933, depending on the 1931 class. The extent of this class cannot be determined at present owing to the lack of facilities for work at sea which makes it impossible to obtain any good measure of the magnitude of a year class until it has been in the fishery for about a year. The yield (catch per trawler day) on the banks off the Nova Scotian coast will be much greater during the spring and summer of 1934 than during the previous year, but should be somewhat less in the late fall and winter.

At the present time the study of the haddock fishery has revealed the major causes of the fluctuations in the abundance of haddock on the banks. In addition, the experiments with savings gear have demonstrated that the use of the correct mesh in the otter trawls will reduce the present destruction of millions of undersized haddock to about one-fifth the present amount, a saving that will contribute directly to the success of the commercial catch in later years. How-

ever, the major objectives still lie ahead; the accurate evaluation of the factors causing good or poor fishing seasons which will enable us to forecast any important increases or decreases in the haddock catch; and the accurate determination of growth rates, mortality rates, and migration, which will enable us to determine the minimum size below which it is economically wasteful to capture haddock. This information is vital for the intelligent exploitation of this resource. Its attainment depends on the availability of facilities for work at sea involving the study of abundance and mortality of haddock below commercial size and the study of migrations.

The regular spring prediction of abundance of mackerel for the 1934 season was issued by the Bureau near the beginning of the season. At that time it appeared that the abundance would be nearly the same as in the previous season and would have provided a catch approximating 54,000,000 pounds if exploitation had been normal. This amount being in excess of the probable market demand, the industry, under authority provided by its Code of Fair Competition, curtailed its mackerel seining activities. In this manner the results of scientific research have been useful to the industry. The trend toward planned exploitation renders more urgent the need for advances in scientific knowledge of this fishery. Badly needed investigations of the reasons for variations in the rate of annual decline of the several year classes and variations in their seasonal appearance in different areas have had to be deferred because of the lack of means for their pursuit.

Investigations of the shore fisheries of the Middle Atlantic States were continued on a greatly reduced scale. It was necessary to abandon several series of field observations before conclusive results were secured, thereby diminishing the value of the results obtained through funds expended on these observations in previous years.

Results of tagging experiments have demonstrated that certain of the more important species migrate extensively over the entire continental shelf between Massachusetts and North Carolina, hence cannot be protected effectively by uncoordinated regulations of individual States. Since the winter trawl fishery is conducted outside the jurisdiction of the States, the continued growth of this fishery adds greatly to the difficulties of protection under the present system of independent legislation by the several States.

Because of the interstate and extraterritorial nature of the fishery, the responsibility for securing knowledge essential for the conservation of this important natural resource is clearly Federal. There is a widespread demand on the part of commercial fishermen and anglers in the Middle Atlantic States for resumption and extension of the scientific studies necessary to provide a sound basis for formulation of a wise conservation policy.

The shrimp investigations conducted by the Bureau in cooperation with the States of Louisiana, Texas, and Georgia have continued the field work throughout the entire range of the commercial shrimp fishery with various modifications to meet the special needs of the problem. Definite evidences have been gathered which show that the shrimp migrate. The nature and extent of their migrations are now being studied by means of population and racial analyses, and preliminary marking experiments are under way.

Ichthyological studies of the South Atlantic and Gulf coasts have included a continuation of taxonomical examinations and revisions of the flounders, gobies, cyprinodonts, and other species. The fresh-water fishes of the State of Mississippi also were studied and a report was submitted to the recently established State game and fish commission as an aid in formulating more effective laws of conservation. The ichthyological studies included, also, a survey of the fresh-water streams and lakes of Puerto Rico, carried on in cooperation with the Insular Department of Agriculture and Commerce, the object of the investigation being the determination of the present status of the fisheries and the possibilities of future cultural operations either of indigenous or introduced species.

#### FISHERY INVESTIGATIONS IN INTERIOR WATERS

Owing to the severe curtailment of funds all field work has been discontinued on the Great Lakes, and the staff has devoted its full time to the analysis of the many fisheries data that have been collected during the past years but which have not yet been compiled in final form for publication. One important phase of the work that is showing promising results is the detailed study of the statistics of the commercial fisheries of Lake Huron for the 5-year period 1929-33. This study has made available not only complete data on fluctuations in the total fishing intensity and in the yield of each commercial species for each of the 6 statistical districts into which Lake Huron has been divided but includes also a precise tabulation of the fishing effort actually exerted for the capture of each of the 8 most important species of the commercial catch. This tabulation of fishing effort for each individual species (necessary since identical types of gear are employed in completely distinct fisheries), together with the elimination of the effect of the different fishing times (nights out) of the same types of gear in different geographical regions, has made possible an accurate determination of fluctuations in abundance, as measured in terms of yield per unit effort, not attainable through less refined methods of procedure. The practical value of the methods employed has been demonstrated clearly in the study of the rapid depletion of the stock that has resulted from the use of the deep trap net for the capture of whitefish.

Another important phase of the Great Lakes work involves the study of the life histories of the more important species of commercial fishes. These studies on the three species of pike perches (sauger, and yellow and blue pike perch) and the yellow perch are rapidly nearing completion and preliminary reports have already been published. On the basis of this work, recommendations are made to the various State conservation departments on proper size limits, closed season, size of mesh in nets, and other regulatory measures. As a result of these studies it was also possible to submit to the National Recovery Administration many basic data to show the need of the inclusion of certain uniform conservation measures in the Great Lakes Fisheries Code.

A manuscript was recently completed for publication on the age and growth of the cisco of certain inland lakes of northeastern Wisconsin, a study made possible by the cooperation of the Wisconsin Geological and Natural History Survey.

## FISHERY INVESTIGATION OF THE PACIFIC COAST AND ALASKA

The staff of the Bureau's Seattle (Wash.) laboratory has continued its investigations of the salmon and herring populations of Alaska and the Pacific coast. These investigations, although confined to definite localities, have as their goal the determination of the causes responsible for the fluctuations in the abundance of the salmon and herring so that provisions may be made for permanent and productive fisheries throughout the entire region.

The red-salmon runs in Bristol Bay and the Karluk, Chignik, and Copper Rivers were observed and information concerning them collected. The results from the studies of the red-salmon runs in the past indicate that the mortality of the young in the streams and lakes is to a great extent responsible for the wide fluctuations in the abundance of these salmon. In view of these findings an attempt is being made to determine some of the causes responsible for this mortality in the Karluk River system.

The studies dealing with the homing instinct and age at maturity of the pink salmon have been submitted in a report which is being published by the Bureau. Observations of the pink-salmon runs in southeastern Alaska were continued for the purpose of determining the causal factors responsible for the fluctuations in the time of appearance and abundance of these runs.

A report has been submitted showing areas inhabited by each of the principal herring races in southeastern Alaska. This information will be of great value in segregating the catch statistics so that the abundance of each race may be determined separately and the intensity of the fishing regulated accordingly.

The statistical study of the sockeye-salmon fishery in Puget Sound has been continued and is demonstrating that severe overfishing eventually will destroy the sockeye-salmon runs in the Fraser River which virtually support this fishery. An attempt is being made to compile a formal report of this study within the next year so as to provide a basis for the regulation of this fishery in order to restore it to its former abundance.

The coho salmon that frequent the waters of the Pacific Coast States and Puget Sound provide the basis for a large sport fishery as well as the commercial fishery in this region. During the past year the Bureau has undertaken a study of the fluctuations in the abundance of these fish for the purpose of recommending measures that will provide for a permanent supply of the coho salmon, both for commercial and recreational purposes.

## AQUICULTURAL INVESTIGATIONS

The investigations in the interest of improved fish-cultural practices have recently been expanded to include field studies dealing with problems which are of vital concern to any program of fisheries management. Under an allotment from the Public Works Administration, stream survey and improvement work has been carried on in the national forests and parks in 15 States. The purpose of the survey is to supply information on the streams and lakes of the public domain for the development of a scientific stocking program.

Under such a program fish will be planted where they will do the most good and the mistakes inherent in the old haphazard system of planting avoided.

The stream-improvement work has been undertaken in cooperation with the Forest Service. Under this arrangement the Bureau has planned and supervised the work which has been done with labor furnished by the Civilian Conservation Corps.

Investigations of means of improving hatchery practices and providing better control of fish diseases have been continued. Breeding experiments with brook trout have been so successful in developing superior strains of fish that the work has been extended to include rainbow and brown trout.

#### SHELLFISHERIES INVESTIGATION

The various problems of the oyster industry were studied in Massachusetts, Connecticut, North Carolina, Florida, Louisiana, and Washington. In cooperation with the Connecticut Shellfisheries Commission, the Bureau continued observations on the growth, fattening, and seasonal changes in the nutritive value of oysters from the experimental farm near Milford, Conn. In New Haven Harbor, where dredging operations in the channel threatened the oyster bottoms, a series of analyses of the water was made for the State authorities and the amount of silt in the water and its rate of settling were determined.

In North Carolina the Bureau's experts worked out the plans of restocking the depleted oyster bottoms and supervised planting operations carried out by the State.

The development of new oil fields in the inshore waters of the Gulf of Mexico creates a new difficulty to the oyster industry. A question has arisen as to what extent the oil in the sea water may affect the oyster bottoms in the vicinity of the oil wells. This difficult problem has been studied in the field and experimentally under controlled laboratory conditions at Beaufort, N. C., Woods Hole, Mass., and Washington, D. C. It has been found that the presence of crude oil in the water decreases the rate of feeding of the oyster and adversely affects the propagation of diatoms which are used by the oyster as food.

A disease of oysters caused by a protozoan parasite, which may have been responsible for the mortality of oysters observed in previous years in certain sections of the coast, was studied at Beaufort. The investigation has not been completed, but several phases of the life history of the microorganism have been revealed.

On the Pacific coast studies of the cycles of setting of the oyster larvae proved of great value to the oystermen who arranged their planting operations in accordance with the information and advice supplied by the Bureau's laboratory at Olympia, Wash.

#### POLLUTION STUDIES

New methods for the biological assay of polluted waters have been developed and put into practical operation at the field stations at Columbia, Mo., Fort Worth, Tex., and aboard the floating laboratory.

quarterboat 348. These methods permit more detailed and more rapid determinations of the effects of the various stream pollutants not only on fish but on the basic fish-food organisms as well under conditions existing in the polluted waters. A systematic study of the effects of effluents of various industrial operations and of municipal sewage is being made with a view to supplying standardized data concerning both the actual and relative toxicity of these effluents to fish and fish food. As a part of this work, a comprehensive study of the toxicity of ammonia, which is one of the chief break-down products of municipal sewage and one of the principal effluents from gas factories, to fish and fish-food organisms under stream conditions, has been completed.

It has been shown by some of the work now completed that certain types of industrial and municipal wastes can be utilized to increase the plankton content of natural waters when these wastes are properly diluted and separated from noxious and toxic wastes. As a basis for plans to conserve these substances, which can be utilized in the production of fish food in inland waters, biological assays of the fish-food values of various wastes are in progress.

Long-time experiments dealing with the effects of erosion silt on fresh-water mussels have been completed at the Fort Worth substation. These experiments have definitely established the fact that even very small quantities of erosion silt are highly detrimental or fatal to the principal commercial species of fresh-water mussels. Other long-time experiments on the survival and growth of fresh-water mussels under conditions of stream pollution are in progress at Fort Worth.

## ALASKA FISHERIES SERVICE

### ADMINISTRATION OF FISHERY LAWS AND REGULATIONS

In general, the Bureau continued the program followed in previous years for the conservation of the fisheries of Alaska, although reduced funds made it necessary to curtail some phases of the work. The Commissioner of Fisheries visited all important fishing districts in the summer and held hearings at about 20 places, giving all interested persons full opportunity to express their views.

Restrictions on commercial fishing were modified during the season as changing conditions warranted, and revised regulations were issued on December 21, 1933, to be effective in 1934. Except for the closure of additional trap sites, most of the changes relaxed existing prohibitions, the purpose being to spread employment wherever possible without impairing the future supply of fish.

A patrol of the fishing grounds was maintained to assure enforcement of the laws and regulations. One hundred and thirty-one stream guards and special employees were engaged for varying periods in this protective work, under the direction of 12 regular employees of the Bureau. Many of these guards furnished their own launches and were stationed at the mouths of salmon streams to prevent poaching in closed areas. Fourteen Bureau vessels, manned by 53 persons, and 2 chartered vessels with 2 men patrolled the larger bodies of water.

Five weirs for counting the escapement of spawning salmon were operated in 1933, chiefly in localities where important biological studies of the salmon have been in progress for several years. Through an allotment of \$6,000 by the Public Works Administration for the purpose, arrangements were made for the operation of 11 salmon-counting weirs in Alaska in 1934. An allotment of \$20,000 of Public Works Administration funds was used in reconditioning and repairing the Bureau's Alaska vessels.

Considerable work was accomplished in the Civil Works Administration project of improving natural propagation conditions in southeast Alaska by the removal of log jams and other obstructions that blocked the passage of salmon to the spawning beds. Three regular employees of the Bureau supervised the work, which gave employment to approximately 200 persons for varying periods. Notwithstanding severe weather during part of the winter, the work was carried forward throughout the first 4 months of 1934. In that time 468 salmon streams were cleared for a distance of 621 miles, and more than 100 miles of trail were cut to assist stream guards in making surveys of the spawning beds.

The destruction of predatory trout in important red-salmon rivers tributary to Bristol Bay was carried on under an appropriation of \$15,000 by the Territorial legislature in 1933, to be expended the next biennium for bounty on these enemies of salmon.

#### ALASKA SALMON HATCHERIES

After the liberation of salmon fry and fingerlings that were reared at McDonald Lake and Afognak from eggs collected in 1932, the operation of the Government's hatcheries at those places was discontinued. One privately owned hatchery, operated under the provisions of the Alaska fisheries act of June 26, 1906, collected 20,650,000 red-salmon eggs in 1933, from which 20,030,000 fry were produced and liberated in Alaska waters.

#### PRODUCTS OF THE FISHERIES

Although the quantity of fishery products in Alaska in 1933 was slightly less than in the preceding year, there was a marked improvement in value, which was of material benefit to the fishermen. Several plants were reopened and employment was given to a larger number of people than in 1932.

Salmon products comprised about 76 percent in quantity and 92 percent in value of the total output of the Alaska fisheries in 1933. Ninety-five percent of the salmon production consisted of canned salmon, the pack amounting to 5,226,000 cases, or 250,829,000 pounds, valued at \$28,376,000. As compared with the pack for 1932, the output of canned salmon showed a decrease of one-half of 1 percent in quantity but an increase of nearly 31 percent in value. The number of canneries operated increased from 87 in 1932 to 91 in 1933.

The total output of Alaska fishery products in 1933 was 346,480,000 pounds, valued at \$32,127,000, as compared with an average of 373,624,000 pounds, valued at \$40,329,000, for the 5-year period from 1928 to 1932, inclusive. The value of the 1933 catch to the



fishermen was approximately \$9,089,000, or about \$2,118,000 more than in the preceding year. There were 21,695 persons employed in the various branches of the industry, as against 20,122 in 1932.

### ALASKA FUR-SEAL SERVICE

#### GENERAL ACTIVITIES

The Pribilof Islands fur-seal herd has increased steadily under Government management, and in 1933 the killing of surplus males was the largest for any year since 1889. About 80 percent of the skins obtained on St. Paul Island were taken by the stripping process, which necessitates removal of the blubber before curing.

Sealing operations were under the direction of a staff of regular employees and were performed by Pribilof Islands natives and by approximately 60 natives brought from the Aleutian Islands for the active sealing season. The work of blubbering the sealskins was done by employees of the Fouke Fur Co., in accordance with the provisions of the fur-seal contract.

In addition to the general repairs and upkeep of buildings and equipment, three new houses for natives were erected on St. Paul Island, and the boat ways at East Landing were completed. There was also some extension of improved roads to facilitate the hauling of sealskins from the killing grounds to the curing plant.

Cooperative assistance was rendered by the Navy Department in detailing the U. S. S. *Vega* to transport the annual supplies to the Pribilof Islands and to bring out the season's take of sealskins, and by the United States Coast Guard in maintaining a patrol for the protection of the fur seals.

For the first time since the fur-seal treaty of 1911 became effective, the Government of the Dominion of Canada in 1933 elected to take delivery of its share of the sealskins taken at the Pribilof Islands, instead of 15 percent of the net proceeds of sale. The skins accordingly were delivered to a representative of that Government at Seattle in August 1933.

#### SEAL HERD

The computed number of animals in the Pribilof Islands fur-seal herd on August 10, 1933, was 1,313,568, an increase of 98,607, or 8.08 percent over the corresponding figure for the previous year.

#### TAKE OF SEALSKINS

In the calendar year 1933 there were taken on the Pribilof Islands 54,550 fur-seal skins, of which 44,448 were from St. Paul Island and 10,102 from St. George Island. This was an increase of 5,214 over the total take in 1932.

#### SALE OF SEALSKINS

Two public auction sales of fur-seal skins taken on the Pribilof Islands were held at St. Louis, Mo., in the fiscal year 1934. On August 28, 1933, there were sold 18,047 black dyed. 6,192 logwood-

brown dyed, and 237 miscellaneous skins for a gross sum of \$469,761.50.

At the second sale, held on April 30, 1934, 17,617 black dyed, 10,039 logwood-brown dyed, and 445 miscellaneous skins were sold for \$575,041.25. At the same time 170 raw-salted Japanese fur-seal skins that had been allotted to the United States as its share of skins taken on Robben Island in 1933 were sold for \$467.50.

Special sales of Pribilof Islands sealskins authorized by the Secretary of Commerce in the fiscal year 1934 consisted of 432 black dyed, 25 logwood-brown dyed, 120 safari-brown dyed, and 13 exhibition skins, at a total of \$13,590.44.

#### FOXES

Blue-fox herds are maintained on St. Paul and St. George Islands, where they roam at large and ordinarily find an abundance of natural food. Prepared rations are fed them during the winter, at which time the animals are trapped for their pelts and for marking and releasing for breeding stock.

The 1933-34 season's take of fox skins consisted of 214 blue and 23 white skins from St. Paul Island and 700 blue and 2 white skins from St. George Island, a total of 939. Thirty-five foxes on St. Paul Island and 192 on St. George Island were marked and released for breeding.

In the fiscal year 1934 there were sold at public auction 1,119 blue and 22 white fox skins that had been taken on the Pribilof Islands in the 1932-33 season. The blue pelts brought \$36,297, and the white pelts \$496, a total of \$36,793.

#### FUR-SEAL SKINS TAKEN BY NATIVES

Under the provisions of the North Pacific Sealing Convention of 1911, Indians of the United States and Canada in 1933 took 2,076 fur-seal skins, which were duly authenticated by officials of the respective Governments. Of these skins, 63 were taken by Indians of southeast Alaska, 29 by Indians of Washington, and 1,984 by Indians of British Columbia.

#### FUR-SEAL PATROL

A patrol for the protection of the fur seals during their northward migration and while at the Pribilof Islands was maintained by the United States Coast Guard, which detailed six vessels to this work. Two vessels of the Bureau also participated in the patrol—one at Neah Bay, Wash., and one in southeast Alaska.

#### PROPAGATION AND DISTRIBUTION OF FOOD AND GAME FISHES

The requirements for economy were met by the complete closure of nine fish-cultural stations, and by operating practically all the remaining establishments on a sharply restricted basis. As a consequence, the output of fish and eggs decreased almost 4,000,000.000 in comparison with the production of the previous year. The 1934 output comprised 3,258,131,200, in comparison with the 7,202,155,000 of the previous year, or a reduction of more than one-half. The com-

mercial fisheries are to a large extent supported by natural reproduction, hence emphasis was placed upon the propagation and distribution of those forms which are required to maintain good fishing in the public domain, and in all public waters of the interior sections. Consequently, there was an actual increase in the production of 10 varieties of game fish, which included all the game trout and the largemouth and smallmouth bass, as well as grayling. The increases ranged from less than 25 to over 70 percent.

A further modification required by curtailment of appropriations involved a change in the system of distribution. The delivery of fish gratis to applicants was strictly limited, and the bulk of the output destined for interior waters was received directly by the applicants at the hatcheries at no expense to the Government. It is gratifying to report that there was in general a favorable response to this change, and the whole-hearted cooperation of sportsmen's clubs and individuals was very evident.

The yield of fingerlings, consisting of fish several inches in length up to adult size, was considerably reduced, dropping to 126,368,200, a reduction of over 50,000,000 under the 1933 figures. This was largely owing to the fact that the salvage operations on the upper Mississippi River, from which a large number of fingerling fish are secured, were greatly restricted. It may be further pointed out that while there was of necessity a tremendous drop in the production of the Federal hatcheries, there was no indication of a slackening in the demand for fish, particularly for game varieties. Several forms such as the cisco and pollock, which have been handled in previous years, were not propagated in 1934.

#### PROPAGATION OF COMMERCIAL SPECIES

*Marine species, Atlantic coast.*—Only two hatcheries propagated these forms during the year, the establishment at Gloucester being one of those which was closed on account of the shortage of funds. As a consequence the production of these varieties was considerably reduced. The percentage of marine commercial forms in the total output was 66.5 percent as compared with the normal proportion of approximately 85 percent. The activities of the stations at Woods Hole, Mass., and Boothbay Harbor, Maine, were greatly circumscribed, the former being responsible for the greater share of the output of cod, haddock, and flounder.

*Pacific salmon.*—Both salmon hatcheries in Alaska were on an inactive basis; consequently, there was a reduction in all species of Pacific salmon except the steelhead variety. The number of sockeye salmon produced was less than 50 percent of that in previous years. Approximately normal conditions prevailed at the other Pacific coast hatcheries at which these forms are propagated.

*Anadromous species, Atlantic coast.*—Here, too, there was a noticeable reduction in the output of shad, Atlantic salmon, and yellow perch. It was impossible to obtain any Atlantic salmon eggs whatever in exchange with the Canadian Government, and the limited distribution of this species consisted of fingerlings held over from the previous year.

The Edenton (N. C.) station was successful in securing an increased number of shad, but this gain was offset by a sharp reduction of operations on the Potomac River. The run of shad was greatly reduced for reasons which have not been fully determined, but are ascribed to the severe winter. No effort was made to propagate yellow perch on the Potomac River, but scattered production was obtained from other hatcheries. No glut herring were handled at all.

*Commercial species, interior waters.*—The closure of all the commercial hatcheries on Lake Michigan was responsible for a negligible production of whitefish and lake trout. No attempt was made to secure eggs of the cisco or lake herring. While the Duluth (Minn.) station was in operation it was possible to secure only a limited number of eggs. The Cape Vincent (N. Y.) station, as has been the case for the last several years, was unable to secure any worthwhile number of eggs of the commercial species, and therefore concentrated its activities on game forms. With the pike perch, however, cooperative activities with the State of Ohio at Put in Bay yielded a record collection of eggs, yielding an output of 836,000,000 fry. The eggs were incubated at both the State and Bureau's hatcheries.

#### RESCUE OPERATIONS

Reduction of the appropriation for fisheries work in the Upper Mississippi Wild Life Refuge to negligible proportions made it impossible to carry on the rescue or salvage of fish to the extent followed under normal conditions. Fish become trapped in landlocked sloughs upon recession of the water throughout a large part of this refuge. Seining crews are sent out to salvage them and return them to open waters. Lack of financial resources for the support of a normal number of crews reduced the number of rescued fish in 1934 to 22,643,000, in comparison with a normal collection of over 50,000,000. Controlled semiartificial ponds within the refuge were operated, however, to produce a satisfactory yield of bass. Some rescue work was carried on in the vicinity of the Fairport (Iowa) station.

#### AQUARIUM

The aquarium located under the main lobby in the Department of Commerce Building is becoming increasingly popular. It has been visited by many organizations such as Boy Scout troops and biology classes, as well as miscellaneous students and the general public.

At the close of the year there were on display 1,533 fish, comprising 62 varieties, and 107 aquatic animals of 6 varieties. During the year a stock of chinook salmon, hatched in the aquarium, has been reared; and there is now on hand a very creditable display of this species, comparatively little known in the East. Over one-half million trout, salmon, whitefish, perch, and shad eggs were displayed and hatched in the model hatching apparatus maintained for demonstration purposes. This activity, together with a model fishway, has been a source of great interest.

The staff of the aquarium has been called on frequently for expert advice in problems relating to the maintenance of home aquaria,

ornamental fish pools, etc. The reserve tanks in the aquarium have been utilized for the temporary holding of game fish destined for distribution and planting in nearby waters.

#### BLACK BASS AND ANGLERS DIVISION

In cooperation with State fish and game authorities the black-bass law has been reasonably well enforced in most of the States where black bass are found in numbers. Through the united efforts of all interested, including the anglers, commercial fishermen, shippers and conservation organizations, a great deal has been accomplished. The work of the Division has been materially enlarged to include a service for the angler in connection with matters pertaining to fish and fishing, such as information in regard to laws, kinds of tackle and baits to use, where certain species are to be found, etc.

There are 3 persons regularly employed in the Division, assisted by from 90 to 103 deputy black-bass law inspectors, who are State officials receiving no salary from the Federal Government but who function under the supervision and direction of the Chief of the Division.

But 5 State legislatures met in regular session in 1934, in which needed black-bass legislation could be obtained, and progress was made in 3 of these. A large amount of educational work was done in the States where further legal protection is needed and where legislatures will be in session in 1935.

There have been illegal shipments of black bass made in various sections of the country. A number of seizures of bass have been made and turned over to charitable institutions. Illegal shipments between Mississippi and Arkansas, Illinois and Missouri, and Maryland and Pennsylvania were formerly of frequent occurrence but have been reduced to a minimum by the activities of the State officials in cooperation with the field officers of the Division, principally through warnings and a large number of seizures under State laws. Considerable difficulty has been had in reference to shipments from Tennessee to Mississippi and Missouri, which have not yet been entirely controlled. Shipments from Florida, and shipments into Indiana, have caused some trouble but have been taken care of, but amendments to the laws of these two States must be made before this situation can be considered satisfactory.

The educational part of the work, impressing upon those interested, the provisions of the Federal law and the necessity of further protecting our valuable black bass, has been successfully continued through publication in the daily press, sporting magazines, and by radio talks.

Fishery Circular No. 9, containing the game-fish laws, the black-bass law in full, the progress in black-bass legislation, and the aims and recommendations of the Bureau in connection with the administration of the law, was revised and republished as Fishery Circular No. 16. (Copies of this circular may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.) A tabulation of the fishing licenses issued by the States and the revenue therefrom was assembled and published for the first time. Various other leaflets were prepared and released,

covering such subjects as part-time licenses, sales of black bass, list of books on angling, necessity of returning small fish to water, etc., for all of which there is a constant demand.

Markets in the principal large cities in Central and Eastern States have been regularly inspected by the field officers for illegal black-bass shipments, and investigations of reports of violations have been made when required. In connection with investigations, the field officers have attended and addressed a great number of gatherings of anglers, sportsmen, conservationists, and others, on the subject of the Federal black-bass law and the necessity for giving these valuable game fish more adequate legal protection.

### VESSELS

The *Albatross II* formerly used by the Bureau in its offshore fishery investigations was returned to the Navy Department during the fiscal year. This was done for two reasons: First, the vessel was very old and not well adapted for the Bureau's work and, second because of reduced funds the Bureau was unable to continue it in operation.

The steamer *Shearwater* was engaged in the usual fish-cultural work at the Put in Bay (Ohio) station during the fall and spring months.

The motor vessel *Fulmar* was turned over to the Division of Conservation of the State of Ohio for its use in fish-cultural operations under a revocable license providing for its maintenance and operation by the licensee and also providing that the licensee would furnish the Bureau with such vessel service as required in connection with its operations at the Put in Bay (Ohio) station.

The *Pelican* was used in connection with fishery investigations off the coast of Maine, and also in fish-cultural work at the Boothbay Harbor (Maine) station.

Fifteen vessels of the Alaska service cruised about 123,000 nautical miles in the fiscal year 1934, as compared with 132,700 nautical miles in the previous year. The *Penguin* covered approximately 28,000 miles, the *Crane* 15,900 miles, and the *Brant* and *Teal* each 11,400 miles.

The *Penguin* served as tender for the Pribilof Islands, with base at Unalaska. Five round trips were made to Seattle during the year to transport personnel and perishable and emergency supplies.

Of the vessels that engaged in fisheries protective work, the *Auklet*, *Murre*, *Petrol*, and *Widgeon*, were employed in southeast Alaska. The *Crane* and *Teal* were in the Alaska Peninsula region and on Cook Inlet, respectively, until about the middle of August, and later assisted with the patrol and stream inspection in southeast Alaska. The *Blue Wing* and *Red Wing* were in the Kodiak-Afognak area, the *Kittiwake* on Prince William Sound, the *Ibis* at Chignik, the *Eider* in the Alaska Peninsula district, the *Scoter* on Bristol Bay, and the *Coot* on the Yukon River.

The *Brant* was used in general supervisory work, chiefly in southeast Alaska, although one trip was made to the westward as far as Bristol Bay. It was engaged also for a short time in the fur-seal patrol off Neah Bay, Wash., relieving the *Eider* in that duty toward the end of April. The *Teal* patrolled waters in the vicinity of Sitka,

Alaska, for the protection of the fur-seal herd during its northward migration. The *Auklet* and *Scoter* participated in the Civil Works Administration project of clearing salmon streams in southeast Alaska of log jams and other obstructions that blocked the passage of salmon to the spawning grounds.

Through an allotment by the Public Works Administration, the *Penguin*, *Eider*, *Crane*, *Brant*, *Murre*, *Kittiwake*, *Teal*, and *Scoter* were reconditioned at Seattle during the winter.

#### APPROPRIATIONS

Appropriations for the Bureau for the fiscal year aggregated \$1,778,850, as follows:

Salaries .....	\$160,400
Miscellaneous expenses:	
Administration .....	3,000
Propagation of food fishes .....	801,755
Maintenance of vessels .....	200,000
Inquiry respecting food fishes .....	173,000
Fishery industries .....	78,000
Protecting sponge fisheries .....	2,750
Protecting seal and salmon fisheries of Alaska .....	340,000
Upper Mississippi Wild Life and Fish Refuge .....	6,835
Enforcement of black-bass law .....	13,110
<b>Total .....</b>	<b>1,778,850</b>





# FISHERY INDUSTRIES OF THE UNITED STATES, 1933<sup>1</sup>

By R. H. FIEDLER, *Chief, Division of Fishery Industries*, JOHN RUEL MANNING, *Chief Technologist*, and F. F. JOHNSON, *in charge, Statistical Investigations*, United States Bureau of Fisheries

## CONTENTS

	Page		Page
Foreword.....	2	Cooperation with the emergency agencies of the Federal Government.....	4
Cooperation with the States.....	3		

### Part 1. Operations of the Division

	Page		Page
Statistical investigations.....	4	Technological investigations—Continued.	
Collection of statistics.....	5	Nutritive value of fishery products—Con.	
Technological investigations.....	6	Oils from salmon cannery trimmings, salmon eggs, and salmon livers.....	15
Research associate.....	7	Mineral constituents of fishery products.....	15
Laboratories.....	7	Developments and improvements of fishing gear.....	16
Preservation of fishery products for food.....	8	Measurements of meshsize of fishing nets.....	16
Improved methods for handling fresh and frozen fish.....	8	Net preservation.....	16
Improvements in the smoking of fish.....	10	Educational and consulting services.....	17
Methods for canning fish in the home.....	10	Marketing investigations.....	18
Studies in the bacteriology of fish preservation and spoilage.....	11	The shrimp industry.....	18
Preservation of fishery byproducts.....	11	The red snapper industry.....	19
Improved methods for manufacturing fish meal from nonoily fish waste.....	12	Marketing grades or standards for fish and fishery products.....	19
Development of fish flour.....	12	Interchangeability of the uses of oils and fats—fish oils.....	20
Haddock-liver oil.....	12	Publications of the Division.....	22
Salmon oil investigation.....	13	Documents, reports, and circulars.....	22
Swordfish-liver oil.....	13	Special articles.....	22
Controlling the oxidation of fish oils.....	13	Statistical bulletins.....	23
Nutritive value of fishery products.....	14		
Swordfish-liver oil.....	14		

### Part 2. Fishery Statistics, 1932

	Page		Page
General review.....	24	Fisheries of the Chesapeake Bay States—Con.	
Canned fishery products and byproducts trade.....	37	Trade in fishery products in Washington, D.C.....	130
Packaged fish trade.....	45	Fisheries of the South Atlantic and Gulf States.....	133
Frozen fish trade.....	47	North Carolina.....	139
Fish frozen.....	47	South Carolina.....	144
Holdings.....	49	Georgia.....	145
Cold-storage holdings of cured fish.....	51	Florida.....	147
Foreign fishery trade.....	52	Alabama.....	155
Fisheries of the New England States.....	55	Mississippi.....	156
Maine.....	61	Louisiana.....	158
New Hampshire.....	64	Texas.....	160
Massachusetts.....	65	Fisheries of the Pacific Coast States.....	161
Rhode Island.....	69	Washington.....	166
Connecticut.....	73	Oregon.....	172
Vessel fisheries at principal New England ports.....	76	California.....	175
Economic aspect.....	76	Halibut fishery of the Pacific coast.....	191
Biological aspect.....	84	Vessel fisheries at Seattle, Wash.....	193
Mackerel fishery of the Atlantic coast.....	95	Lake fisheries.....	196
Fisheries of the Middle Atlantic States.....	98	Fisheries of the Mississippi River and tributaries.....	212
New York.....	104	Lake Pepin.....	213
New Jersey.....	109	Lake Keokuk.....	214
Pennsylvania.....	114	Mississippi River between Lake Pepin and Lake Keokuk.....	215
Delaware.....	115	Fisheries of Alaska.....	217
Vessel fisheries at New York City and Groton, Conn.....	118	Common and scientific names of fishery products.....	224
Shad fishery of the Hudson River.....	118	Statistical survey procedure.....	230
Fisheries of the Chesapeake Bay States.....	119	Methods of collection.....	230
Maryland.....	122	Compilation practices and terms.....	234
Virginia.....	125	Conversion factors.....	235
Shad and alewife fisheries of the Potomac River.....	129		

<sup>1</sup> Appendix I to the Report of the U.S. Commissioner of Fisheries, 1934. Approved for publication, Mar. 19, 1934.

## FOREWORD

In order to understand the great economic importance to the Nation and to the public welfare of the field of service which this Division of the Bureau's activities covers, it is necessary to bear in mind that there are only two basic food industries, namely, the products of the land and the products of the sea. Food must be obtained from either land or sea. In the broad sense, the fisherman is the farmer of the sea. As such, he is a primary producer and at the present time he is in need of the same services as are being given to the farmer of the land. This will give a general perspective of the functions which should be performed by the Division of Fishery Industries. This report only describes the functions which the Division actually performs with the personnel, funds, and facilities available. It thus can be seen quite readily that there is a wide variance between the functions which the Division could and should perform with adequate facilities and those functions which it does perform with present facilities. The chief need of the fishery industries of this country today is a more efficient and orderly system of marketing its products. These marketing reforms cannot be worked out overnight. Very little study has been made by the Federal establishment of marketing methods in the fisheries. The importance of laying the foundation, as soon as possible, for these marketing studies in the fisheries will be apparent as this report unfolds. The fisheries constitute one of our great natural resources and a most vital source of foods for the American people. All of the activities and functions of this Division are devoted to the fullest economic husbandry and utilization of the annual harvests of these resources. As this report proceeds, it will be seen that some of the Division's activities have great significance in conservation and thus are of great concern to the American people and their posterity.

This report constitutes a summary of the activities of the Division of Fishery Industries as well as an annual review of fishery statistics of the United States. As its name indicates, this Division of the Bureau is concerned with the activities and welfare of the fishery industries, including the commercial fisheries, the trade in fishery products, and the fish canning and preserving industries. Its functions include the collection and publication of fishery statistics, the conducting of market surveys, the prosecution of research designed to solve the technical problems of the industry, and the dissemination of authoritative and practical information to the fishery industries and the public. Results of technological investigations and marketing studies are published in separate documents as each project is completed. The information obtained from statistical surveys is published in part 2 of this report, which includes detailed statistical information for the year 1932 that has become available since the issuance of the previous report ("Fishery Industries of the United States, 1932," by R. H. Fiedler), together with such summarized statements and interpretations of the statistics as are deemed significant and useful. In the preparation of this report, members of the Division's staff have taken part and their assistance is appreciatively acknowledged.

## COOPERATION WITH THE STATES

Because of the Division's recognition of its responsibilities for service to the industry, as indicated in the preceding paragraphs, it has made every effort to obtain the maximum of accomplishment and extend its services to the fullest extent with the relatively small appropriations and facilities available. Therefore, it has initiated, encouraged, and fostered cooperation with the States in all branches of the Division's various functions and activities. Obviously, this method has brought results with a minimum of expense to the taxpayer, commensurate with efficient performance. Cooperation with the States has been especially helpful in the scientific investigations of the Division. In the technological section, many State agencies have cooperated in extending their facilities for the prosecution of these studies. State universities, hospitals, agricultural experiment stations, and other State institutions of research have contributed of their personnel and laboratories in various projects. Especially has this been true in the nutrition studies. Among the State institutions cooperating in this work are the South Carolina Food Research Commission and State Medical College, Charleston, S.C., the Massachusetts State Agricultural College, Amherst, Mass., the Ohio State Agricultural Experiment Station, Wooster, Ohio, the New York State College of Agriculture, Cornell University, Ithaca, N.Y., Washington State College and Agricultural Experiment Station, Pullman, Wash., the University of Washington, Seattle, Wash., and the University of Maryland, College Park, Md. In addition to cooperation in nutrition investigations, the members of the staff of the Massachusetts State College, Amherst, Mass., rendered valuable aid to the technological staff of the Division's laboratory at Gloucester, Mass., in the furtherance of the various experimental projects which this laboratory is carrying out. In tests of fishing gear, with respect to measurement of mesh size of nets, cooperation has been received by our technological staff from the States bordering on the Great Lakes.

In certain marketing investigations, including the studies of the grading of fish, the States of Virginia, North Carolina, Massachusetts, Maryland, and New Jersey either cooperated actively or gave valuable aid in some form.

The Division places great dependence upon cooperative arrangements with the various States in the collection of fishery statistics. In the annual surveys of the fisheries of the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from State fishery agencies in recent years that it has been only necessary for agents of the Bureau to conduct fragmentary surveys to supplement the data available. Recently, the States of Maryland and Virginia have adopted very complete statistical programs which not only alleviate the work of our agents but also produce more accurate data.

The above States have been cited as instances of exceptional cooperation. However, nearly every State in which commercial fishing is prosecuted renders some type of cooperative service to this Bureau in connection with its statistical surveys which makes possible the surveying of much larger territories than would otherwise be possible.

In addition to the above, at the request of the Florida State Marketing Bureau and Home Extension Service of the University of Florida and the Florida State College for Women, and in cooperation with these organizations, the Division assigned a member of its technological staff to assist the State and County Home Demonstration Agents in teaching the people of that State how to preserve, cook, and otherwise prepare, and utilize to the fullest extent, the fishery products of Florida. Norman D. Jarvis, assistant technologist of this Division performed these duties. As a result of his work, Bureau of Fisheries Memorandum S-331, entitled "Method for Smoking Fish in the Southern States, with Recipes for Cooking," and Bureau of Fisheries Memorandum S-332, entitled "Method for Dry Salting Fish in the Southern States, with Recipes for Cooking," were published. In previous years, other cooperative educational work was instituted and carried out by both Mr. Manning and Mr. Jarvis of the technological staff.

### **COOPERATION WITH THE EMERGENCY AGENCIES OF THE FEDERAL GOVERNMENT**

During 1933, various emergency agencies of the Federal Government, recently established, made considerable use of the facilities of the Division of Fishery Industries, including its technical, marketing, and statistical reports and the knowledge and experience of its personnel. Such cooperation was rendered to the National Recovery Administration, the Agricultural Adjustment Administration, the Federal Emergency Relief Administration, the Federal Surplus Relief Corporation, and others. Members of the Division's staff were detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to supervise and assist in the formulation of fishery codes of fair competition under the National Industrial Recovery Act, and others of the staff were called at the various conferences and public hearings in connection with the development of these fishery codes. In August 1933, R. H. Fiedler, chief of the Division, was detailed first to the Agricultural Adjustment Administration and later to the National Recovery Administration to become chief of the fisheries' section in connection with these code activities. John Ruel Manning, chief technologist, and F. F. Johnson, in charge of statistical investigations, were called as Government witnesses at many of the code hearings. In addition, the Division has furnished fishery statistics to aid in the formulation of fishery codes. Technical, marketing, and statistical information and reports were also furnished to nearly all of the emergency organizations of the Federal Government established during 1933 to promote economic recovery.

### **Part 1. OPERATIONS OF THE DIVISION**

#### **STATISTICAL INVESTIGATIONS**

The statistical investigations include the collection of primary fishery statistical data, compilation and analyses of these data, and dissemination of statistical reports. However, the funds and personnel available for this work have never been sufficient for extensive analytical work and curtailment of these items in recent years have

resulted in decreased activities in connection with the collection of primary statistical data. These lessened activities are unfortunate since annual catch figures are necessary for the study of depletion of fishery resources. Furthermore, statistical analysis of economic phases of the industry are especially urgent at this time when such data are essential to administrative agencies concerned with planning and control, as well as to the industry itself.

#### COLLECTION OF STATISTICS

The statistical work in 1933, as in former years, included the collection and dissemination of statistics on the catch of fishery products and the operating units employed in making the catch, and, in addition, certain statistics of related fishery industries. In the former group are statistics that are intended for the use of the fishery biologist upon which to base conservation measures. They are also valuable for economic purposes. This is especially true of statistics of the landings of fish at principal fishing ports, which are published monthly. In the second group are statistics that are of use mainly for economic or trade purposes. These included statistics of canned fishery products and by-products of the United States and Alaska, cold storage holdings of fish and amounts of fish frozen, marine-animal oil production, and similar statistics.

The Division continued its plan of making annual general statistical surveys of the fisheries of the various geographical sections in 1933, and under the direction of F. F. Johnson, surveyed the commercial fisheries of our entire coastal and lake regions obtaining catch figures for 1932. Continuous annual catch figures are now available for the Great Lakes from 1913, Pacific Coast States from 1922, South Atlantic and Gulf States from 1927, New England States from 1928, and the Middle Atlantic and Chesapeake Bay States from 1929. That portion of the general statistical surveys relating to the wholesale trade, except for the production of canned, frozen, and packaged fishery products and fishery by-products which is obtained in special surveys, was omitted from the surveys made in 1933 due to curtailment in funds and personnel.

In addition to the general catch statistics, the collection and/or publication of statistics on special subjects for the year 1933, was continued during the year, as follows: The landings of fish by American fishing vessels at the ports of Boston and Gloucester, Mass., Portland, Maine, and Seattle, Wash. (published monthly); landings of halibut at North Pacific coast ports (published monthly); catch of mackerel in the North Atlantic fishery; cold-storage holdings of frozen and cured fish and amount of fish frozen, which are furnished by the Bureau of Agricultural Economics (published monthly); production, consumption, and holdings of marine-animal oils of the United States and Alaska (published quarterly by the Bureau of the Census); production of canned fishery products and by-products of the United States and Alaska; transactions on the sponge exchange at Tarpon Springs, Fla.; volume of fishery products handled at the municipal fish wharf and market, Washington, D.C.; and the volume of the United States foreign trade in fishery products, furnished by the Bureau of Foreign and Domestic Commerce.

## TECHNOLOGICAL INVESTIGATIONS

Never before in the history of the fishery industry of this country has there been greater need for economy in production methods and for the fullest utilization of valuable products from the material at hand. Under present conditions of depressed business, losses or leakages in factory operation, which in more prosperous times seemed relatively unimportant, now represent very frequently the margin between profit and loss. For this reason there is greater need for the application of the best technological and engineering knowledge available to problems of manufacture, preservation, and marketing of fishery products. This is essential to make the most of the raw material available, to eliminate waste, and to bring factory operation to the highest point of efficiency. With this objective in mind, the technological research has followed the general lines of studies of methods of manufacture, preservation, storage, and marketing of both the primary products of the fisheries for food and the by-products for animal nutrition; biochemical tests to determine the food value of fishery products; the development of fishing gear; and experiments in developing chemical treatments for fishing nets to lengthen their usefulness. This has involved the application of the sciences of chemistry, engineering, bacteriology, and general technology to the solution of these problems. The discussion in the following pages is a summary of the accomplishments along these lines which have been made during the past year.

The accomplishments of the technological staff during recent years have resulted in notable contributions of outstanding value to both American fisheries and American agriculture. Among these achievements is the development by the Division's technologists of domestic fish oils of high vitamin potency, essential for use in human and animal nutrition, freeing this country from its almost complete dependence on foreign sources of fish oils of high vitamin potency.

Since, contrary to popular notion, baby chicks, rather than babies, consume most of these vitamin-bearing fish oils, this has meant a great deal to American agriculture. Information from reliable sources has indicated that, after taking into consideration all of the factors, the farmer is paying from one half to one third of the former price for these oils for animal feeding. In this connection, it should be borne in mind that fish oils are used extensively in mixed feeds as a source of the vitamin D carrier or ingredient. Recently, large pharmaceutical houses have turned to domestic sources of vitamin-bearing fish oils for human nutrition and medicinal use. This means that the entire public eventually is going to benefit from these discoveries by the technologists of this Division. Furthermore, the fisheries have benefited in that higher markets and better prices have been obtained for their products; and such inter-related or auxiliary industries, depending on these sources of raw material for their finished products, such as the pharmaceutical industry and the manufacturers of mixed feeds, also have benefited materially in that they have been made independent of foreign sources of raw material, and in that they have been able to get their raw material at more favorable prices, in many instances. In other words, all of these American industries have benefited, either directly or indirectly, from the differential in prices which is a direct result of the fish oil investigations.

Until recent years, most of the waste fish and the fish waste from the various fishery industries had not been manufactured into any products of economic value. As a result of our technological investigations, it is now possible to make fish meal of high quality for animal feeding from this waste. The fish-meal industry has now developed to a point where it makes valuable use of most of the waste or raw material available for its manufacture. There are still many places, however, where technical and economic obstacles prevent the profitable utilization of some of this waste.

Our studies of the waste from the vast filleting industry in New England have shown that a highly nutritious and palatable fish flour can be made, which is rich in calcium and phosphorus—those minerals so essential to the growth and maintenance of bones and teeth in children. Fish flour makes good soup stock and lends itself favorably to incorporation in bakery products.

Other studies which we have made of the great diversity of nutritional factors in fishery products have revealed many facts of immense value to the national dietary, such as the demonstration that oysters rank high as a source of those minerals of vital importance in the prevention and treatment of certain types of nutritional anemia.

Considerable interest has been shown in our recent published report that kelp meal is a valuable supplement to the rations of farm animals. This is particularly important since very little commercial development exists in the various seaweed industries of the United States, whereas in Japan seaweeds alone are the basis of an \$8,000,000 industry.

It has been estimated that about 20 cents of every dollar that the fisherman gets for his catch is spent to replace fishing nets. This amount can now be reduced by the application to the nets of chemical preservatives which have been developed by the technological staff of this Division. A conservative estimate places the savings, which can be made annually, at approximately \$2,000,000.

#### RESEARCH ASSOCIATE

In the above lines of technological research the Bureau has attacked those fundamental problems which promise to be of greatest value to the largest number and which are possible with the funds and personnel available for the purpose. For this reason the Division has not been able to study special problems affecting certain products, processes, or methods. In order to serve the industry in this connection, the Bureau by congressional authorization has provided research associate facilities whereby firms or groups having special technological problems to solve will furnish the investigator and pay his salary and expenses. The investigation is carried out in cooperation with the Bureau's staff in its laboratories and under its control. Thus the industry can be provided with laboratory, consultation, and library facilities which in many instances it is unable to obtain elsewhere.

#### LABORATORIES

During the past year, the Division carried on its technological investigations under the direction of John Ruel Manning, chief technologist, at laboratories in Washington, D.C., Gloucester, Mass., Seattle, Wash., and Charleston, S.C. All of the above are Bureau of

Fisheries laboratories with the exception of the Charleston laboratory, which is a State laboratory. In addition, certain phases of our technological investigations were conducted in other laboratories as conditions warranted. For instance, certain cooperative studies were carried out in the laboratories of the various State institutions mentioned in the preceding section of this report under "Cooperation with the States." Some of our technological studies were carried out in the laboratories of various bureaus in the Department of Agriculture, and a portion of the investigations in the preservation of fishing gear which were prosecuted in the Navy Rope Factory, Boston Navy Yard, under the control of the Bureau of Construction and Repair, Navy Department.

In Washington, D.C., the technological facilities of the Division include a nutrition laboratory, a well-equipped chemical laboratory, and a mechanical laboratory with carpenter and machine shops. Those problems which concern or affect the country as a whole are usually selected for study in the Washington laboratories. As an example, a large part of the nutrition experiments are conducted in Washington.

The Gloucester laboratory is intended primarily to serve as the headquarters for the conduct of technological investigations of the fisheries of the Atlantic coast, and is so equipped as far as possible under present conditions. The Gloucester organization includes a well equipped chemical laboratory, a bacteriological laboratory, a low temperature laboratory designed primarily for the study of fresh and frozen fish, and a small byproducts laboratory.

The Seattle organization includes a well-equipped chemical laboratory and a byproducts laboratory, with the use of some of the laboratories of the University of Washington.

The Charleston laboratory, as stated above, is a State laboratory, although the Division has personnel stationed in this laboratory and contributes to its upkeep. A financial arrangement has been worked out whereby investigations in the State laboratory can be performed at less expense to both the Federal Government and the State of South Carolina than either could conduct alone. The Charleston laboratory is equipped for both chemical and nutrition research.

#### **PRESERVATION OF FISHERY PRODUCTS FOR FOOD**

Our experimental work in fish preservation has utilized the services of chemists, engineers, and bacteriologists. Investigations in this section were carried out under the immediate direction of James M. Lemon, associate technologist, in charge of the Gloucester Technological Laboratory and by Norman D. Jarvis, assistant technologist, in the Washington Technological Laboratory.

#### **IMPROVED METHODS FOR HANDLING FRESH AND FROZEN FISH**

During the course of the investigations being conducted at the Bureau's technological laboratory at Gloucester, Mass., it became evident that it would be necessary to devise an accurate method for the determination of the relative decomposition of fish flesh. After several different methods were investigated, it was found that a combination of two of the methods gave a very satisfactory indication of both the enzyme and bacterial action in the flesh, both of which



cause a breakdown in the protein composing the fish tissue. This method is based on the absorption of a standard acid solution by the protein. It was found that an accurate index of the condition of the flesh was indicated by measuring electrometrically the quantity of acid absorbed. Haddock was the species of fish upon which this test was first applied. After making tests on a series of several hundred samples, it was possible to tabulate the results in such a way that a table for general use was evolved. It was found that it would be necessary to prepare a table of this nature for each species of fish since the property for absorbing acid by the protein varies slightly in different species. At present, tables are being prepared for use with cod, pollock, and mackerel. Some tests have also been made on Pacific coast salmon.

Other problems connected with the freezing and storage of fishery products are being studied. There are a great number of variable factors and combinations which arise in the consideration of problems of this nature. Although the technologists are making an effort to solve each of these problems as they arise, the variable conditions make progress difficult and slow.

Our technologists are investigating the technique of freezing several varieties of shellfish, and the effect of storage and fluctuations of temperature in the storage room. With these studies are included such conditions as the effect of freezing and storage upon the keeping quality of the product after it has been defrosted and displayed for sale, and the rate of increase of bacteria during this same period. Oysters and shrimp are given immediate attention since these two species compose the greater portion of shellfish being marketed. The change of weight over short and long periods of time is included in the study of the effect of packing fishery products in ice for shipment. The results, which are apparent at the present time, indicate that the weight of some species of fish increases for a short period then gradually decreases until at the end of approximately 10 days a decided loss in weight is noted. It has been observed that different species of fish show different rates of decrease in weight when packed in ice for shipment.

The development of lactic acid is the cause of the well-known "rigor mortis" which occurs in the flesh of all animals immediately subsequent to death. The effect of the further development of lactic acid in fish muscle is receiving attention. Attempts are being made to correlate the presence of different quantities of this acid with the different changes which occur when fish are frozen and placed in cold storage rooms. It is believed that the presence of lactic acid in the flesh of fresh fish, which are being frozen for storage, may have a very definite effect upon the keeping quality and flavor of them when they reach the hands of the ultimate consumer. In making studies of this nature, it has been necessary for the technologists to make trips in some of the small boats and bring in live fish, keeping them alive in a tank in the laboratory until they were needed. When the necessary preparations had been made, the fish were killed and tests made immediately for lactic acid. This method permits a study of the development of lactic acid in the fish muscle at frequent intervals as it increases to a maximum, then decreases until it disappears. Samples containing a known percentage of lactic acid are frozen and the results of these various concentrations upon the keeping quality observed.

A method for packing fish and fillets in an atmosphere of carbon dioxide was developed and the effect of this procedure observed. It was found that, for long periods of shipment, the atmosphere of carbon dioxide had a decided beneficial action both on the bacterial count and on enzyme action. In the case of short periods of shipment, the carbon dioxide was not appreciably better than air. It was observed that, in order to obtain full benefit, fish should be placed in an atmosphere containing approximately 25 percent of carbon dioxide gas immediately upon being caught.

All of the present methods for the determination of water in protein compounds are tedious and require considerable time for completion and the accuracy of most of them is somewhat doubtful. In some of the studies of stored fish it has been necessary to determine the moisture content of the flesh at frequent intervals and to a greater degree of accuracy than has heretofore been possible. A method has been developed for this determination which eliminates all of the difficulties previously encountered. A period of only a few hours is required for this determination by the new method and the accuracy is far greater than any previously employed. The water combined with the protein is liberated by coagulating the protein with acetone. The water and the acetone are then evaporated leaving only the completely dried protein. It has been possible to obtain results by this method which check within one tenth of 1 percent.

The following members of the technological staff performed the above-described investigations of the chemistry of the production, handling, preservation, storage, and marketing of fresh and frozen fish: James M. Lemon, Francis P. Griffiths, Maurice E. Stansby, Louella E. Cable, Richard Locke, Francis Yetman, and Donald Bean. These scientific workers are all located in the Division's technological laboratory at Gloucester, Mass.

#### IMPROVEMENTS IN THE SMOKING OF FISH

For the past several years, our Gloucester laboratory has carried out experimental work in the smoking of fish. As described in previous annual reports of this Division, a small model smokehouse was constructed so as to control the various factors affecting the quality of smoked fish such as temperature, humidity, volume of smoke, etc. Finnan haddie of uniformly high quality were produced experimentally by our technologists. Reports are being prepared for publication on certain completed phases of this work.

Mackerel were found to yield a smoked product of exceptionally high quality both as to appearance and flavor. The smoke was applied at as low a temperature as possible and in an atmosphere of high moisture content. It is believed that a market for smoked mackerel could be developed which would open a considerable field for the disposal of some of the surplus mackerel at a reasonable profit to the producer.

#### METHODS FOR CANNING FISH IN THE HOME

Because of the great demand from home economics workers of the various counties, States, and of the Federal Government, and due to a large number of inquiries received by this Bureau for methods, safe and satisfactory to the housewife, for canning fish in the home, and

because the present published literature on the subject is somewhat obsolete, we began the experimental canning of fish during the past year to obtain data for working out methods of canning fish which would be practical for the housewife with the training and equipment available to her. The following experimental packs have been made to date: Fish flakes; fish cakes; fish chowder; mullet, plain, tomato sauce, and spiced; mackerel, plain, tomato sauce, spiced, and smoked; amberfish; salmon, plain for 60 minutes, plain for 90 minutes, and spiced; grouper; squeteagues; croaker; eels; catfish; carp, plain, and spiced; lake trout; whitefish; shrimp, in number 2 cans and pints, in number  $\frac{1}{2}$  flat cans and 5-ounce glass jars; crab; clams, minced, whole, and chowder; and oysters. It is estimated that it will be at least another year before these results can be published by the Bureau since it will be necessary to make extensive bacteriological examinations of the experimental packs for varying periods of time after all of the experimental canning has been completed. The experimental canning in connection with this project is being carried out by Norman D. Jarvis, in our Washington laboratory and the bacteriological examinations are being conducted by Francis P. Griffiths in our Gloucester laboratory.

#### STUDIES IN THE BACTERIOLOGY OF FISH PRESERVATION AND SPOILAGE

The bacteriology and chemistry of fish preservation go hand in hand. Therefore, we are closely coordinating the chemical and the bacteriological phases of attack on the problems described in the preceding sections. The changes caused by the action of bacteria are closely related to the chemical changes which accompany enzyme action in the fish flesh. Attempts are being made to correlate the various stages of spoilage with the bacterial count in each of these stages. In order that a comparison might be made of the popular methods of judging the degree of spoilage with the actual bacterial count, a number of tests were conducted. Opinions as to the organoleptic tests were made and the bacterial count of the fish at each stage was taken. Charts were prepared which showed that the organoleptic test is quite indefinite and is as variable as the number of persons making the test. It would indicate, however, that the organoleptic test within a wide range correlates fairly well with the bacterial count.

In addition to the bacteriological investigations above-described, certain aspects of the bacteriology of fishery food technology were extended to the studies of the smoking of fish and of the home canning of fish. These tests have been discussed in previous sections of this report. All studies in bacteriology have been conducted in the Gloucester laboratory by Francis P. Griffiths, bacteriologist of the Division's technological staff.

#### PRESERVATION OF FISHERY BYPRODUCTS

During the past year research in connection with the preservation of fishery by products has been continued at the Gloucester Technological Laboratory and new work undertaken in the recently established technological laboratory located at Seattle, Wash. These studies were carried on under the direction of Roger W. Harrison with the assistance of Andrew W. Anderson and S. R. Pottinger.

IMPROVED METHODS FOR MANUFACTURING FISH MEAL FROM NONOILY  
FISH WASTE

The experimental work on improved methods for the manufacture of fish meal from nonoily fish waste as outlined in the 1932 report was completed during 1933. A comprehensive report of the investigation is now in the process of preparation. Data obtained during the course of the investigation indicate the following:

1. The digestibility, vitamin value and general nutritive value of the meal is affected by drying time, temperature of drying and method of applying heat, while the essential amino acid, Cystine, is affected more by temperature.

2. Of the various factors affecting the general nutritive value of fish meals which were investigated; namely, digestibility of the protein, biological value of the protein, essential amino acids and vitamin potency, vitamin G appeared to have greatest influence on the feeding results obtained with the fish meal.

3. Vitamin G is found largely in the head portion of cod and haddock fillet waste.

4. Vitamin G is found in the water soluble proteins and is therefore partially removed by wet processes for nonoily fish reduction generally used.

5. By satisfactory control of the temperature within a dryer, by regulation of steam pressure and vacuum, the glue problem encountered in the dry reduction of this type of material can be overcome.

6. Operation made possible by the conditions of (5) above, permit the preparation of a fish meal of greater general nutritive value with greater final yield of finished product.

## DEVELOPMENT OF FISH FLOUR

Owing to the fact that quite satisfactory use is now being made of nonoily fish waste in the preparation of fish meal and the necessity to curtail work on account of reduced appropriations, the fish flour work was temporarily discontinued for the purpose of undertaking an investigation needing more immediate attention.

## HADDOCK-LIVER OIL

The investigation concerning the physical, chemical, and biological properties of haddock-liver oil which was discussed in the 1932 report, was completed during the past year and a report of the results obtained is being prepared for publication. As stated in the last report, concern had been expressed as to the possibility of the properties of haddock-liver oil differing sufficiently from cod-liver oil to make an oil prepared largely from haddock livers incapable of meeting the existing United States Pharmacopoeia requirements for cod-liver oil, with respect to chemical and physical properties of the oil specified by the United States Pharmacopoeia.

The data obtained indicate that there is little likelihood of this occurring in the case of crude oils, but if the United States Pharmacopoeia requirements are held for winterized or cold-pressed oils, it is entirely possible that an oil of this nature will exceed the upper limit for iodine number. This is especially true in the oils from livers of haddock taken during the summer months and on Georges Bank.

By raising the upper limit for iodine number from 180 to 190, the danger of haddock-liver oil not meeting United States Pharmacopoeia requirements should be entirely eliminated.

#### SALMON OIL INVESTIGATION

In an effort to bring about increased utilization of fishery waste materials by conversion into useful products, the Bureau began, in 1933, an investigation concerned with the manufacture of vitamin-active oil and high quality meal from salmon waste. The possibilities for this development may be appreciated when it is considered that during 1932 the waste available from the salmon fishery was capable of yielding approximately 12,000 to 15,000 tons of meal and from 1,500,000 to 2,000,000 gallons of oil, while actual utilization resulted in the manufacture of only 2,435 tons of meal and 250,871 gallons of oil. During the season of 1933 studies were carried on in canneries located on the Columbia River and on Puget Sound. This work was largely of a preliminary nature to determine the nature and amount of oil in the different portions of the waste and the quality of the oil from the different species. Work was also begun on improved methods of oil manufacture.

The preliminary indications are that an oil can be produced commercially that will be comparable with cod-liver oil in both vitamins A and D. Also carefully prepared salmon meal should prove to be one of the best protein concentrates available for animal feeding.

The investigation is being continued and will be reported further next year.

#### SWORDFISH-LIVER OIL

With the discovery and successful exploitation of halibut-liver oil in the field of human nutrition, there has been an increasing interest in new sources of natural concentrates of vitamins A and D. Working on the premise that vitamin storage in fish may be a function of age, the Bureau began an investigation of the oil obtainable from the liver of the swordfish taken commercially on Georges Bank and adjacent fishing banks off the coast of New England.

Livers were procured and investigated from the standpoint of oil content and the nature of the oil present. Analysis showed that the moisture content of the liver varied between 60 and 68 percent; oil content, between 13 and 22 percent; and flesh residue, between 15 and 24 percent. The oil was a dark viscous fluid which solidifies at relatively high temperatures.

Samples of oil, examined colorimetrically, indicate that swordfish-liver oil is an extremely potent carrier of vitamins A and D. Several experimental methods of preparing the oil were studied. The vitamin tests of swordfish-liver oil, described later on in this report, indicated that solvent extraction methods yielded an oil of higher vitamin potency than oil extracted from the livers by mechanical processes.

#### CONTROLLING THE OXIDATION OF FISH OILS

Fish oils are composed of glycerides of saturated and unsaturated fatty acids. The unsaturated fatty acids have the ability to take up oxygen from the air and, when spread in a thin layer, form a relatively tough, protective film. This is known as drying, and constitutes the

value of drying oils in paints. Where fish oils are used for other than their drying properties, their ability to take up oxygen proves a handicap since oxidation leads to thickening and the acquiring of an undesirable odor and taste. When oils are winterized or cold pressed in order to give them the property of remaining fluid and clear at low temperatures, the proportion of unsaturated fatty acids to saturated fatty acids is increased, with the resultant tendency for them to have a greater faculty for taking up oxygen. Certain chemical compounds, when mixed with an oil of this nature, have the ability to retard oxidation. These are known as antioxidants or inhibitors, and should have usefulness in stabilizing the keeping properties of fish oils in certain uses. With this in mind, the Bureau has undertaken an investigation of the use of antioxidants in fish oils. The work which has just begun will be continued during the coming year.

### NUTRITIVE VALUE OF FISHERY PRODUCTS

Since we are dealing fundamentally with a food industry and, therefore, since our technological investigations constitute a highly specialized field of food research, obviously the nutritive or food value of fishery products is of primary importance. This applies not only to the fishery products of current commercial importance, but also applies to any experimentally manufactured products resulting from studies of improvements in manufacture, preservation, handling, storage, and marketing. In other words, the consumer is not only interested in the fishery products now on the market and available for human nutrition and in the byproducts now available for animal nutrition, but he is interested in any improvements that can be made in these products by experimental work. It naturally follows that quality and increased food value are the measurements of any improvements which can be made in the products of this industry. For this reason, our nutrition experiments play an extremely important and vital role in our program of technological investigations, viewing these integrated phases of our technological program as a coordinated whole. Therefore, our nutrition tests serve two important functions. The first function of nutrition studies is to determine the quality and food value of current fishery products of commerce. The second function of this work is to provide a yardstick for evaluating improvements in methods of manufacture, preservation, handling, storage, and marketing, in terms of the quality and food value of the finished products of these experimental methods as compared with the finished products of commercial methods now in use.

During the past year various phases of our program of nutrition research were carried out in our laboratories in Washington, D.C., and in the State laboratory at Charleston, S.C., by the following members of our technological staff: E. J. Coulson, Charles F. Lee, and C. D. Tolle.

### SWORDFISH-LIVER OIL

Recently the Bureau announced in a press release the results of studies made by members of its technological staff in connection with the vitamin content of swordfish-liver oil and the developments of methods of production of swordfish-liver oil of high vitamin potency. This work was performed in the Division's technological laboratories

located in Gloucester, Mass., Washington, D. C., and Seattle, Wash., by the following members of our technological staff: Roger W. Harrison, S. R. Pottinger, Andrew W. Anderson, and Charles F. Lee. Certain details concerning the swordfish-liver oil investigation have been discussed in a previous paragraph of this report under the heading of "Preservation of Fishery Byproducts." The nutrition tests in our Washington laboratories revealed that swordfish-liver oil contains from 75 to 100 times as much vitamin D as the United States Pharmacopoeia standard reference cod-liver oil, and from 15 to 25 times as much vitamin A as this standard cod-liver oil. Since the United States Pharmacopoeia standard reference cod-liver oil contains about 3,000 international vitamin A units and 95 international vitamin D units, this means that swordfish-liver oil contains from 45,000 to 75,000 international vitamin A units, and from 7,000 to 9,500 international vitamin D units. According to these results, while swordfish-liver oil is not as rich as halibut-liver oil in vitamin A content, it is many times higher in vitamin D.

#### OILS FROM SALMON CANNERY TRIMMINGS, SALMON EGGS, AND SALMON LIVERS

During the past year, our Washington Nutrition Laboratory continued vitamin assays of various oils experimentally prepared by our byproducts section from salmon cannery trimmings, salmon eggs, and salmon livers. The results of our vitamin assays to date have shown that salmon-liver oils are approximately 5 to 20 times as potent in vitamin A and approximately 2 to 3 times as potent in vitamin D as an average medicinal cod-liver oil. The oils prepared from salmon eggs varied considerably, although these compared favorably in vitamin potency with an average medicinal cod-liver oil. The same is, in general, true of oils from cannery trimmings.

#### MINERAL CONSTITUENTS OF FISHERY PRODUCTS

Much has been written in the scientific literature in recent years concerning the increasing importance of minerals in nutrition. Probably no other class of foods offers so attractive a field of study, in this respect, as fishery products since it is commonly known that these products contain minerals in quantity and variety, many of which have been shown by scientific investigators to be of great importance in both human and animal nutrition. In the State laboratory at Charleston, S. C., E. J. Coulson, a member of our technological staff, has been making an extensive study of the nutritive value of minerals in fishery products. Chemical analyses of the quantity of these minerals in various fishery products of commercial importance are being made. Following this, these fishery products are fed to laboratory animals to determine the biological value of such minerals. It is hoped that later on it may be possible to extend these mineral nutrition studies to patients in the State hospital or medical clinic in Charleston. While this study, because of its large scope, will necessarily require many years for completion, certain portions of it have been completed and the following reports have been prepared for publication by the Bureau: "The Iodine Content of Oysters", published as Bureau of Fisheries Memorandum S-334; "Studies on

the Nutritive Value of Oysters", published as Fisheries Investigational Report No. 17; and "The Oyster as a Source of Minerals", a report yet to be published. The above investigation has included other fishery products as well as oysters, but the work has not sufficiently progressed that reports on these commodities can yet be prepared.

#### DEVELOPMENTS AND IMPROVEMENTS OF FISHING GEAR

As stated previously in this report, certain of our technological and marketing investigations are of vital importance in any broad program of conservation of our fishery resources. There are few other fields of investigation which offer any greater opportunity for contributing to real conservation than developments and improvements in the various types of fishing gear which are used in the actual catch of fish.

#### MEASUREMENT OF MESH SIZE OF FISHING NETS

For many years, there have existed in various parts of the country numerous controversies between the conservation authorities of the States involved and interested parties in the fisheries, concerning the mesh size of fishing nets used in the various waters of those States. These disputes are, in themselves, indicative of the great importance of the size and type of fishing nets as an influence on conservation measures. The mesh size of nets determines the kinds and numbers of undersized and immature fish which will be permitted to escape from the commercial fisherman and, in the interests of conservation, contributes to the maintenance of the fisheries. Therefore, our technologists, as well as our biologists, have cooperated with the States and with the industry on this great problem. In this connection, during past years, technologists of this Bureau and of the Bureau of Standards have made a study of devices to enable the conservation authorities of the States to establish and apply uniform enforcement of these mesh sizes of nets. However, during 1933, due to limitations of appropriations in this Bureau and in the Bureau of Standards, this investigation had to be suspended temporarily.

#### NET PRESERVATION

The development of and tests of commercial preservatives for fishing nets were continued during 1933 by W. T. Conn, a member of the Division's technological staff. The work followed two principal objectives, one to confirm previous season's tests and the other to test new formulas developed. Several years ago, our technologists discovered that the greatest menace to fishing nets in fresh water consisted in attacks on the netting by cellulose digesting bacteria. In addition to recommendations for treating these nets with toxic dyes, as described in previous annual reports of this Division, it has been found during the past year that chrome tanning of the cotton netting is superior to these previously developed dye processes and that, where bacterial action is not serious, an improved method of cutting twine produces good service. In all cases, better results are obtained by covering the treated nets with a good grade of tar, properly applied, in addition to one of the above treatments.

Another serious problem in net deterioration has been the fouling of nets by weeds and other marine growth after the nets have been in



waters for varying lengths of time. Studies of this problem have revealed that certain mercury compounds are valuable in checking these growths.

Other chemicals tested out during the past year, of value in net preservation, include various antioxidants. It has been found that the inclusion of antioxidants in tar for treating nets is an improvement over plain tar treatments, since the antioxidants increase the flexibility of the tarred net, thereby prolonging its useful life. A detailed study has been made of the effect of exposing cotton and linen twines to rain and comparing these stocks dried in sunshine and in the shade. The sun-dried twines deteriorated very rapidly. The shade-dried linen deteriorated slightly in 6 months, but the cotton twine gained in strength. In these tests, it was found that even a small amount of soft coal smoke was very destructive to both linen and cotton twines.

During the past year, our technological staff cooperated with the Bureau of Construction and Repair of the Navy Department in developing chemical preservatives for manila cordage. It was found that antioxidants were of value in prolonging the life of linen cordage or rope. This work will result in considerable savings to the Navy Department since this Department naturally uses large quantities of this material.

During 1933, we issued a pamphlet entitled "More Life from Fish Nets", by W. T. Conn. This pamphlet proved to be very popular and hundreds of fishermen have written in for copies of it. In order to reach the fishermen of the country so that they could take advantage of the recommendations in this pamphlet, notices were sent to post offices where fishermen receive their mail and to small town newspapers. The interested response on the part of the fishermen was most gratifying.

#### EDUCATIONAL AND CONSULTING SERVICES

In addition to the activities previously described, our technological staff conducts very important educational and consulting services for those interested in the fisheries. Some of these educational functions and consulting services have been discussed or referred to in preceding paragraphs of this report. Therefore, it is only necessary to summarize these services and to describe their nature. We have cooperated with various State institutions, colleges, universities, schools, and other public institutions in disseminating information on the preservation, utilization, food value, etc., of fishery products. This has been done by means of lectures, practical demonstrations, radio addresses, letters, and reports. The members of our Division staff also prepare answers to letters or inquiries received by the Bureau from persons and companies interested in various industrial problems in the fisheries. These inquiries contain questions on the various problems connected with the manufacture, preservation, handling, storage, statistics, and marketing of the products of the fisheries. This correspondence is answered by reference to our published literature and the publications of other institutions of fishery research, from the information contained in the Bureau of Fisheries' Library, and from the knowledge and experience of the various technologists. The replies to these inquiries constitute a technological consulting service conducted by the Bureau for the benefit of the public.

Our technological publications and activities have attracted students to Washington, in recent years, from all parts of the world. Among those visiting our technological laboratories in Washington and elsewhere in the United States, during 1933, were students, scientific investigators, and members of the faculties of foreign universities from the following countries: England, France, Norway, Japan, Egypt, Argentina, and the Philippine Islands.

### MARKETING INVESTIGATIONS

As indicated earlier in this report, the great need of the fishery industry today is marketing reform. Almost every conceivable system of marketing known is used in the fisheries. Considerable confusion and disorganization exist, permitting many practices which react unfavorably against the industry. Present marketing conditions in the industry are permitting the distribution and introduction to the public of inferior merchandise. This inferior merchandise unquestionably acts as a deterrent in any efforts to increase the consumption of fishery products in this country, and reacts against the industry as a whole. There is no intention here to be unduly critical of members of the industry. In fact, only constructive criticism is offered. It is recognized that there are many able and progressive individuals and firms in the fishery industries and some of the products of the industry are merchandise of high quality. However, a small amount of inferior merchandise can do more harm than the good accomplished by a large amount of good merchandise. It is a well-known fact that the United States has a lower annual per capita consumption of fishery products than most of the important nations of the world. This is not, by any means, entirely caused by the fact that we are primarily an agricultural nation, but is largely influenced by the lack of quality and standards of quality in the marketing of fishery products and the great confusion existing among producers, dealers and consumers, as to the intrinsic value of the products they are handling. It is recognized that there is justification for a greater "spread" in prices between producer and consumer in this industry, on account of the high rate of perishability of its products, but there is no permanent reason or excuse for the "spread" which exists under present conditions of marketing. The Bureau realizes that the needed marketing reforms cannot be accomplished overnight, but that to be successful they must be based on fundamental and thorough surveys of present conditions in the industry and recommendations to be made only after thorough studies founded on sound principles of economics.

### THE SHRIMP INDUSTRY

An economic survey of the shrimp fishery and industry of the South Atlantic and Gulf States was made during 1933 by Fred F. Johnson of the Division of Fishery Industries and Milton J. Lindner of the Division of Scientific Inquiry.

It was brought out that the catch of shrimp in the South Atlantic and Gulf States in 1931 amounted to 96,451,000 pounds, with a value to the fishermen of \$2,730,000. This represents 97 percent of the volume and 95 percent of the value of the catch of the shrimp fisheries of the United States and Alaska. This fishery gave employment to

more than 14,000 persons as fishermen and workers in wholesale and manufacturing establishments.

The prosecution of this fishery and the packing and allied industries it supports, furnish the livelihood of many entire southern communities and contribute an important food product to the domestic and foreign trade of this country. Thus, it is essential that proper steps be taken to assure the future supply of this crustacean and that there be technological development of fishing and plant operation, and improved business methods, in order that normal activities in the industry may be expected not only in the immediate, but in the more distant, future as well.

These essentials of the industry require the concerted attention and efforts of the shrimp interests. Organization should lead to a development of statistical procedure that can definitely point out when and where depletion of the fishery may be imminent and remedial action be taken in time. It should foster research to improve fishing boats and gear, methods of handling, improvement of the finished product, marketing methods, and endeavor to establish new markets; and it should evolve a definite and adequate cost of production system to be followed by its members that they may know in what department their costs are excessive, and further that they may be able to price their goods to make a fair profit.

The paper which will publish the results of this survey will include for the South Atlantic and Gulf States the following sections among others: Natural history; fishing grounds; the fishermen; plant workers; methods of capture; craft used in capture; seasons of capture; preparation for market; marketing; prices; nutritive value; and data for foreign shrimp fisheries and markets.

#### THE RED SNAPPER INDUSTRY

During 1933, Norman D. Jarvis, assistant technologist, completed his investigation of the red snapper industry which was begun in 1932. The results of this study have been summarized in a report entitled "Fishery for Red Snappers and Groupers in the Gulf of Mexico", which the Bureau expects to publish during the coming year. This report contains information on gear, equipment, etc., used in the red snapper fishery and in the preparation, handling, and shipment of products of this fishery. It contains recommendations as to methods for smoking red snapper and grouper and suggestions with respect to other methods of preservation and handling.

#### MARKETING GRADES OR STANDARDS FOR FISH AND FISHERY PRODUCTS

At the request of various States, the Division has undertaken a study of the possibilities for establishing and applying voluntary marketing grades or standards for fishery products. This work has been under the direction of John Ruel Manning, chief technologist. The studies have been made in cooperation with several States on the products in those States. The work was begun over a year ago in Virginia by J. H. Meek, director, and N. W. Broome, supervisor, Virginia Division of Markets, and Mr. Manning of this Division. The experience of the past year in Virginia has shown that these marketing grades or standards are practical and have been successful in improving the economic condition of producer and dealer.

Consumers are much better satisfied, since they recognize in these grades dependent standards of quality. As pointed out in the Division's report for 1932, marketing standards have been very successful with all kinds of agricultural products. In addition to our work in Virginia, we have cooperated with other States during 1933 in the study of this marketing problem. Among the States where actual studies have either begun or where considerable interest is being shown are North Carolina, Massachusetts, Maryland, and New Jersey.

During 1933, in connection with the formulation of fishery codes, Mr. Manning prepared several reports on the standardization or grading of fishery products, based on his brief surveys, for the National Recovery Administration and the Agricultural Adjustment Administration. Considerable interest has been shown in this work by consumers. The Consumers' Advisory Board of the National Recovery Administration has used considerable of the material from our reports in its efforts to develop consumer's standards.

From our investigations to date, it appears that a national and uniform system of voluntary grading and standardization is practical and will be of considerable aid ultimately to the entire fishery industry. It will be a great contribution to conservation in keeping undersized and immature fish from the market and in eliminating waste. It would tend to stabilize the industry, cut down merchandising costs, would assist materially in the prevention of destructive price cutting, would facilitate the procurement of necessary credit by fishing enterprises from banks and other financial institutions, would assist in the elimination of evils of the consignment business, would increase the consumption of fishery products, and would be of general benefit to the producer, dealer, and consumer. It cannot be emphasized too strongly that marketing reforms in the fisheries are vital to any conservation program in the fisheries.

#### INTERCHANGEABILITY OF THE USES OF OILS AND FATS—FISH OILS

Because of the extremely depressed economic condition of the oils and fats industry in this country, and its direct effect on fish oils and other marine animal oils, the Division gave considerable thought and study to this problem. In fact, studies of the economic and marketing conditions of the fish-oil industry have engaged the attention of our division staff for the past several years. Recently, at the request of the Finance Committee of the United States Senate, John Ruel Manning, chief technologist, made a study of the technical and economic conditions in this industry, and prepared a brief summary concerning the interchangeability of the uses of oils and fats, with special reference to fish and marine animal oils. The summary is given below.

The information given herewith deals only with saponifiable oils and fats and does not pertain to the petroleum or mineral-oil industry.

The interchangeability of the uses of oils and fats in commerce and in the various industries involves both technical and economic considerations. From a technical standpoint, there can be and is free interchangeability of the uses of various oils and fats. Modern methods of hydrogenation, refining, treatment, etc., make it possible to prepare practically all oils and fats for almost any industrial use.

This means that it is possible, chemically, to use practically any animal or vegetable oil or fat in soap manufacture or in some of the other possible consuming industries of these commodities. Therefore, the actual practice of the interchangeability of the uses of oils and fats is a matter of prices or other economic considerations. Formerly, certain technical and economic obstacles prevented any great interchangeability. At the present time, certainly no technical obstacles exist, and it is doubtful that there are many economic obstacles which would hinder complete potential interchangeability.

It is quite true that the specifications of the finished product may to a certain extent govern interchangeability. However, in many instances, favorable economic influences will overcome even these requirements or specifications.

The statement is quite often made that this or that particular oil or fat is not suitable for the manufacture of soap or other finished products, because of the relatively high or low content of the particular oil or fat in some specific fatty acid. This statement is not true for the following reasons: Animal and vegetable fats and fatty oils are of similar general composition since they are mixtures of compounds of glycerin and certain organic acids, which, due to their presence in fats, are called fatty acids. Obviously, the variable in the composition of these materials is the fatty acid portion. For this reason, the properties of the various fats and oils, and consequently their desirability for a particular use, depend primarily upon their constituent fatty acids and the proportion of these various acids present. This situation applies to all oils and fats, both marine animal, terrestrial animal, and vegetable. Without making the discussion too involved, it is a known fact among chemists and technologists that developments in hydrogenation processes have made it possible to convert unsaturated liquid oils to any desired degree of hardness. Consequently, the apparent difference in the natural qualities of various fats and oils has resolved itself into little actual difference insofar as the possibilities for the interchangeability of these materials is concerned, or where hard fats are required for the particular use in question. It is, therefore, readily seen that, whenever economic considerations enter into the industrial picture, or in other words, when the price of a particular oil or fat is relatively low, it is quite often advantageous and economically attractive to substitute as an ingredient of the finished product a cheaper oil or fat than the one formerly used. It is commonly known among those familiar with the uses of oils and fats that such substitution or interchangeability is actually practiced in the consuming industries whenever market conditions are sufficiently favorable.

Statistics show that there is a world surplus of oils and fats. There is a domestic surplus of oils and fats for nearly all domestic uses. With the great possibilities for the interchangeability of the uses of these oils and fats as discussed above, it is readily apparent that a highly complicated and competitive market for these raw materials exists. Even though a particular oil or fat, because of some special natural property, is favored for certain specific uses, this specific oil or fat will be affected either directly or indirectly by changes in the market for these commodities as a whole. In other words, if the supply of oils or fats intended for shortenings, for other edible use, for a source of vitamins for use in either human or animal nutrition,

is more than the market can absorb, this oil or these oils and fats will affect and be affected by the supply and demand for other oils for other uses. Since the soap kettle is the principal consumer of oils and fats, it is probably one of the important, if not the most important, factors affecting the general market situation for these commodities. If an oil or fat is especially desired for some particular use and is commanding a higher price for that use than it would command for soap manufacture, and cannot find a market for this higher priced use, it will gravitate to the market for soap manufacture.

This is just one example of how the possible and actual interchangeability of the uses of various oils and fats can and does affect markets and prices for each and every type of oils and fats under conditions of a world surplus and a domestic surplus of oils and fats.

### PUBLICATIONS OF THE DIVISION

During the calendar year 1933 the following publications were prepared by members of the Division's staff. These do not include the monthly statistical bulletins of the landings of fishery products at Boston and Gloucester, Mass., Portland, Me., and Seattle, Wash., nor the monthly reports on cold-storage holdings of frozen fish and quantities of fish frozen. The fishery documents, reports, and circulars may be purchased at the prices shown from the Superintendent of Documents, Government Printing Office, Washington, D.C. The statistical bulletins and special or S-memoranda are distributed free of charge upon request to the Bureau. The special articles may be obtained from the sources of publication.

Those wishing to receive current copies of this report and statistical bulletins issued by the Bureau should request that their names be placed on the Bureau's mailing lists no. 128 for the Annual Statistical Report, 128a for general statistical bulletins, and 128b for monthly cold-storage reports. Those desiring historical statistical data on the domestic fisheries for the period 1880 to 1929 should consult the report entitled "Fishery Industries of the United States, 1930" by R. H. Fiedler, Appendix II to the Report of the United States Commissioner of Fisheries for the fiscal year 1931.

### DOCUMENTS, REPORTS, AND CIRCULARS

COULSON, E. J.

Studies on the nutritive value of oysters. 8°, 30 pp., 8 figs. Investigational Report No. 17. 5 cents.

FIEDLER, R. H.

Fishery industries of the United States, 1932. Appendix III, Report of Commissioner, 1933. 8°, 301 pp. 20 cents.

### SPECIAL ARTICLES

ANDERSON, A. W., ROGER W. HARRISON.

A survey of the fishery byproducts industry of Maine. Fishing Magazine, November 1933, December 1933, and February 1934. New York City.

CONN, W. T.

Net preservative research, 1932, with recommendations. Bureau of Fisheries Memorandum S-330, January 27, 1933. Published in Fish and Oyster Reporter, March 1933, Tampa; Atlantic Fisherman, April 1933, Goffstown; Cord Age, May-June 1933. New York City.

Atmospheric exposure of linen and cotton with special reference to fish nets. Bureau of Fisheries Special Memorandum 1651-G, November 21, 1933. Published in Fishing Magazine, November 1933, New York City, and Fish and Oyster Reporter, December 1933. Tampa.

CONN, W. T.—Continued.

The tanning or barking of nets. Bureau of Fisheries Memorandum S-333, December 16, 1933.

More life from fish nets. Bureau of Fisheries Special Memorandum 1651-H, December 26, 1933.

COULSON, E. J.

The iodine content of oysters. Address before the Medicinal Chemistry Section, American Chemical Society, Washington, D.C., March 27, 1933. Bureau of Fisheries Memorandum S-334.

Nutritive value of oysters. Fishing Gazette, August 1933, New York City. Bureau of Fisheries Special Memorandum 2468-C.

FIEDLER, R. H.

Problems in the marketing of fishery products in the United States. Fish and Oyster Reporter, January 1933. Tampa.

JARVIS, NORMAN D.

Fish as food. Address before First District Conference, Florida State Chamber of Commerce, Apalachicola, Fla., April 29, 1933. Published in Fish and Oyster Reporter, July 1933. Tampa.

Method for smoking fish in the Southern States, with recipes for cooking. Bureau of Fisheries Memorandum S-331, July 1933.

Method for dry salting fish in the Southern States, with recipes for cooking. Bureau of Fisheries Memorandum S-332, October 1933.

JOHNSON, F. F., W. H. BROWN.

Retailing 'em alive in Miami and New Orleans. Fishing Gazette, March 1933. New York City.

MANNING, JOHN RUEL.

Look to the sea for your diet. Lecture delivered to class of dietitians at Army Veterinary School, Army Medical Center, Washington, D.C., on February 6, 1933. Bureau of Fisheries Special Memorandum 1061-A.

Nutritive value of marine products. Lecture delivered at Western Maryland College, Westminster, Md., March 21, 1933. Bureau of Fisheries Special Memorandum 2468-B.

Technological investigations in the fisheries. Lecture delivered to class of students in aquiculture and zoology, University of Maryland, College Park, Md., April 4, 1933. Bureau of Fisheries Special Memorandum 2520.

Fish meal in animal feeding. Paper presented before Fisheries' Section of the Fifth Pacific Science Congress in Vancouver, Canada. June 8, 1933. Published by His Majesty's Printing and Stationery Office, London, England.

Fish oils are a form of national health insurance. Published in United States News, September 16, 1933.

Fish flour as nutritive food for economy diet. Published in United States News, September 23, 1933.

The vital importance of establishing marketing grades or standards for fish and fishery products in the United States. Bureau of Fisheries Special Memorandum 2450-E.

Standardization of fishery products. Address delivered before the 15th Annual Meeting of The National Association of Marketing Officials, Washington, D.C., December 20, 1933. Bureau of Fisheries Special Memorandum 2450-H.

STANSBY, MAURICE, JAMES M. LEMON.

An electrometric method for detection of relative freshness of haddock. Analytical Edition, Industrial and Engineering Chemistry, vol. 5, p. 208, May 15, 1933. Bureau of Fisheries Special Memorandum 2511.

### STATISTICAL BULLETINS

Fisheries of the New England States, 1931. Statistical Bulletin No. 1030.

Fisheries of the Middle Atlantic States, 1931. Statistical Bulletin No. 1015.

Fisheries of the Chesapeake Bay States, 1931. Statistical Bulletin No. 1012.

Fisheries of the South Atlantic and Gulf States, 1931. Statistical Bulletin No. 1028.

Fisheries of the Pacific Coast States, 1931. Statistical Bulletin No. 1027.

Fisheries of the United States and Alaska, 1931. Statistical Bulletin No. 1032.

Manufactured fishery products of the United States and Alaska, 1931. Statistical Bulletin No. 1033.

Fishery products frozen and cold storage holdings of frozen and cured fishery products in the United States and Alaska, 1932. Statistical Bulletin No. 1022.  
Production of fresh and frozen packaged fish in the United States, 1932. Statistical Bulletin No. 1023.  
Canned fishery products and byproducts of the United States and Alaska, 1932. Statistical Bulletin No. 1026.  
Fisheries of Alaska, 1932. Statistical Bulletin No. 1034.  
Landings by fishing vessels at principal New England ports, 1932—By months. Statistical Bulletin No. 1016.  
Landings by fishing vessels at the three principal New England ports, 1932—By gear and fishing grounds. Statistical Bulletin No. 1017.  
Fishery products landed by United States fishing vessels at Seattle, Wash., 1932. Statistical Bulletin No. 1029.

## Part 2. FISHERY STATISTICS, 1932

### GENERAL REVIEW

The catch of fishery products in the United States and Alaska during 1932 decreased slightly from that in the previous year, the decrease amounting to 1 percent in quantity; however, the value decreased 27 percent. The value of the production of canned fishery products decreased 31 percent as compared with that in the previous year; and byproducts decreased 25 percent. There were also decreases in the production of packaged and frozen fish products. There was a decrease of 31 percent in the value of imports and 33 percent in the value of exports as compared with 1931.

During 1932 the domestic fisheries employed about 116,000 persons as fishermen. The catch amounted to 2,614,140,000 pounds, valued at \$54,764,000. In addition, the fishery for seed oysters showed a production of 3,076,000 bushels, valued at \$768,000.

In 1932 in the United States and Alaska, the production of canned fishery products amounted to 416,062,000 pounds, valued at \$43,749,000 and the output of byproducts was valued at \$12,466,000. The production of fresh and frozen packaged fish (exclusive of packaged shellfish) amounted to 51,976,000 pounds, valued at \$5,741,000, while the pack of frozen fishery products amounted to 92,472,000 pounds, estimated to be valued at \$7,000,000.

Fishery products imported for consumption were valued at \$29,566,000, and domestic exports were valued at \$7,808,000.

*New England States.*—The 1932 statistics for the catch of these States showed a decrease in volume as compared with any year for which there are records since 1924, and a decrease in value as compared with any year since 1902. The landings of fish by vessels at Boston and Gloucester, Mass., and Portland, Maine, showed a considerable decrease under 1931. The production of frozen fish decreased about 4 percent.

*Middle Atlantic States.*—The catch of fishery products of the Middle Atlantic States in 1932 was less in both volume and value than in any preceding year for which data are available. The landings of fish at New York, N.Y., and Groton, Conn., decreased sharply under 1931 landings. There was a decrease in the production of both packaged and frozen fish. The catch of shad in the Hudson River increased appreciably in 1932 over 1931.

*Chesapeake Bay States.*—In 1932 the catch of fishery products in the Chesapeake Bay States was greater than that in any year since 1920 for which there are records, but the value of the 1932 catch was



less than that for any year for which there are records since 1888. There was a large increase in the catch of croakers and menhaden.

*South Atlantic and Gulf States.*—The catch of fishery products of the South Atlantic and Gulf States in 1932 showed a small increase over that of 1931, but the value was less than in any year since 1902. There was a decrease in the production of canned shrimp and an increase in the output of canned oysters and menhaden products.

*Pacific Coast States.*—The catch statistics of the Pacific Coast States for 1932 showed the smallest catch since 1926, and a value less than in any year for which there are records since 1915. There were decreases in the packs of canned sardines, canned salmon, canned tuna, and frozen fish.

*Lake States.*—The United States fisheries prosecuted in the Great Lakes and the international lakes of northern Minnesota in 1932 decreased somewhat under the previous year. Beginning in 1929 a revised statistical procedure was used, including certain products not canvassed in some of the preceding surveys, and there was a change in the methods of collecting statistics in some of the States.

*Mississippi River and tributaries.*—The most recent complete catch statistics of the fisheries of the Mississippi River and tributaries are those collected for the year 1931. As compared with the 1922 survey, there was a decrease in the catch which was reflected principally in a smaller catch of fresh-water mussels. These are used primarily in pearl button manufacture.

*Alaska.*—The catch of fishery products in Alaska in 1932 was slightly greater in volume due to the resumption of whaling but less in value than that in 1931. The pack of canned salmon in 1932 was less than that of the previous year. There was a decrease in the amount of frozen fish and an increase in the amount of cured fish and byproducts.

*Fisheries of the United States and Alaska, 1932*<sup>1</sup>

SUMMARY OF CATCH: BY SECTIONS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Product	New England, area XXII		Middle Atlantic, area XXIII		Chesapeake, area XXIII		South Atlantic and Gulf, areas XXIV and XXV		Pacific	
	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value
Fish .....	440,918	9,184	112,302	1,938	267,107	2,548	184,158	2,715	542,859	8,416
Shellfish, etc. ....	39,603	4,817	28,919	2,716	91,900	3,357	115,759	3,713	17,032	1,052
Whale products.....								937		16
Total .....	480,521	14,001	141,221	4,654	359,007	5,905	299,917	6,428	560,828	9,484

  

Product	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Fish .....	81,829	4,304	44,062	2,258	595,943	6,813	2,269,178	38,176
Shellfish, etc. ....	1,915	28	38,320	640	2,913	158	336,361	16,481
Whale products.....					7,664	91	8,601	107
Total .....	83,744	4,332	82,382	2,898	606,520	7,062	2,614,140	54,764

<sup>1</sup> All figures are for 1932, except those for the Mississippi River and tributaries, which are for 1931.

NOTE.—The above excludes the seed-oyster fishery. See separate section following. The roman numerals appearing under the names of the sections are the numbers given these areas by the North American Council on Fishery Investigations. It should be explained that there are included under these areas craft owned under the respective areas but at times fishing elsewhere.

*Fisheries of the United States and Alaska, 1932—Continued*

## OPERATING UNITS: BY SECTIONS

Item	New England	Middle Atlantic	Chesapeake	South Atlantic and Gulf <sup>2</sup>
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	5, 142	2, 862	2, 056	2, 409
On boats and shore.....	11, 330	5, 508	18, 890	19, 151
Total.....	16, 472	8, 370	20, 946	21, 560
<b>Vessels:</b>				
Steam.....	24	8	19	-----
Net tonnage.....	3, 988	1, 600	2, 021	-----
Motor.....	594	407	110	441
Net tonnage.....	16, 984	6, 616	1, 768	6, 646
Sail.....	2	-----	193	71
Net tonnage.....	53	-----	2, 005	841
Total vessels.....	620	415	322	512
Total net tonnage.....	21, 025	8, 216	5, 794	7, 487
<b>Boats:</b>				
Motor.....	4, 604	1, 593	8, 216	5, 052
Other.....	3, 791	2, 046	6, 014	7, 797
Accessory boats.....	1, 212	48	52	85
<b>Apparatus:</b>				
Haul seines.....	84	331	302	891
Purse seines.....	179	22	27	42
Otter trawls (including all types and sizes).....	523	179	27	1, 680
Gill nets.....	11, 081	2, 399	11, 811	10, 860
Trammel nets.....	-----	-----	-----	358
Pound nets, trap nets, and weirs.....	517	642	2, 674	1, 737
Stop nets.....	-----	116	7	7
Fyke nets.....	349	3, 100	1, 873	1, 085
Bag nets and pocket nets.....	108	-----	-----	-----
Other nets <sup>4</sup> .....	391	396	2, 872	2, 062
Hooks, baits, or snoods.....	3, 758, 823	735, 884	1, 372, 819	324, 694
Fish wheels.....	-----	-----	-----	21
Eel pots and traps.....	5, 136	6, 995	9, 654	1, 325
Lobster pots.....	341, 595	44, 653	-----	-----
Crab and crawfish pots, traps, drags, etc.....	3, 351	50	-----	4, 635
Clam dredges.....	79	90	-----	1
Crab dredges.....	-----	67	126	-----
Mussel dredges.....	-----	2	-----	-----
Oyster dredges.....	114	360	794	577
Scallop dredges and drags.....	3, 949	955	610	64
Crab scrapes.....	-----	-----	1, 036	-----
Tongs, rakes, hoes, forks, picks, grabs, etc.....	4, 441	2, 813	12, 321	2, 920
Sponge diving outfits.....	-----	-----	-----	54
Other apparatus <sup>6</sup> .....	3, 275	177	-----	2, 593

Item	Pacific	Lakes	Mississippi River and tributaries	Alaska	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	6, 132	1, 705	-----	<sup>3</sup> 8, 059	28, 365
On boats and shore.....	11, 750	5, 227	15, 884	-----	87, 740
Total.....	17, 882	6, 932	15, 884	8, 059	116, 105
<b>Vessels:</b>					
Steam.....	4	106	-----	4	165
Net tonnage.....	106	2, 364	-----	276	10, 355
Motor.....	928	392	-----	442	3, 314
Net tonnage.....	24, 219	4, 055	-----	6, 088	66, 376
Sail.....	5	-----	-----	-----	271
Net tonnage.....	2, 107	-----	-----	-----	5, 006
Total vessels.....	937	498	-----	446	3, 750
Total net tonnage.....	26, 432	6, 419	-----	6, 364	81, 737

<sup>2</sup> Includes the operating units used in the fisheries of Lake Okeechobee, Fla.<sup>3</sup> Includes persons in boat and shore fisheries.<sup>4</sup> Includes dip nets, scap nets, reef nets, push nets, and other minor nets.<sup>6</sup> Includes fish pots; harpoons; spears; gaffs; crab, sponge, and crawfish hooks; periwinkle and cockle pots; coquina scoops; and other apparatus not included in "Other nets."

## Fisheries of the United States and Alaska, 1932—Continued

## OPERATING UNITS: BY SECTIONS—Continued

Item	Pacific	Lakes	Mississippi River and tributaries	Alaska	Total
	Number	Number	Number	Number	Number
Boats:					
Motor.....	5,028	1,624	4,426	1,083	31,626
Other.....	1,001	1,535	10,120	3,055	35,359
Accessory boats.....					1,397
Apparatus:					
Haul seines.....	135	332	1,013	90	3,178
Purse seines.....	364			292	926
Lampara nets.....	184				184
Otter trawls (including all types and sizes).....	2				2,411
Beam trawls.....	60			12	72
Paranzella nets.....	21				21
Gill nets.....	3,671	103,518	101	3,651	147,092
Trammel nets.....	50	226	518		1,152
Pound nets, trap nets, and weirs.....	330	9,259	374	363	15,896
Stop nets.....					130
Fyke nets.....	2,268	2,574	32,541		43,790
Bag nets and pocket nets.....					108
Other nets <sup>4</sup> .....	419		191	50	6,381
Hooks, baits, or snoods.....	1,230,999	960,513	2,459,179	( <sup>5</sup> )	10,842,911
Fish wheels.....	29			283	333
Eel pots and traps.....					23,110
Lobster pots.....					386,248
Shrimp nets and traps.....	438				438
Crab and crawfish pots, traps, drags, etc.....	24,877	2,910	18	900	36,741
Clam dredges.....					170
Crab dredges.....					193
Mussel dredges.....			440		442
Oyster dredges.....	4				1,849
Scallop dredges and drags.....					5,578
Crab scrapes.....					1,036
Tongs, rakes, hoes, forks, picks, grabs, etc.....	3,910	126	3,994		30,525
Abalone diving outfits.....	18				18
Sponge diving outfits.....					54
Crowfoot bars.....		360	4,480		4,840
Other apparatus <sup>6</sup> .....	76		3,781		9,902

CATCH: BY SECTIONS <sup>7</sup>

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf <sup>8</sup>		Pacific	
FISH	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Albacore.....			18	( <sup>9</sup> )						
Alewives.....	3,572	19	2,295	15	21,405	117	6,664	42		
Amberjack.....	1	( <sup>9</sup> )					5	( <sup>9</sup> )		
Anchovies.....									299	3
Barracuda.....							4	( <sup>9</sup> )	2,927	156
Black bass.....					34	4	310	22		
Bluefish.....	648	52	4,767	163	911	46	2,131	78		
Blue runner or hardtail.....							163	2		
Bonito.....	45	2	1,036	27	56	3				
Bowfin.....							2	( <sup>9</sup> )		
Buffalofish.....							12	( <sup>9</sup> )		
Butterfish.....	2,262	100	3,862	143	3,897	114	56	1		
Cabio or crab eater.....					4	( <sup>9</sup> )	6	( <sup>9</sup> )		
Cabrilla.....									340	12
Carp.....	41	3	330	32	363	19	128	7	93	2
Catfish and bullheads.....	2	( <sup>9</sup> )	62	5	883	28	4,364	139	254	27
Cero.....							13	1		
Cigarfish.....							9	( <sup>9</sup> )		

<sup>4</sup> Includes dip nets, cast nets, scap nets, reef nets, push nets, and other minor nets.<sup>5</sup> Number not determined.<sup>6</sup> Includes fish pots; harpoons; spears; gaffs; crab, sponge, and crawfish hooks; periwinkle and cockle pots; coquina scoops; and other apparatus not included in "Other nets."<sup>7</sup> Salt fish have been converted to the basis of round weight.<sup>8</sup> Includes the catch of fish taken in Lake Okeechobee, Fla.<sup>9</sup> Less than 500 pounds or dollars.

*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
FISH—continued	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Cod	86, 276	1, 725	7, 481	176	22	1	2	( <sup>o</sup> )	11, 746	128
Corbina									2	( <sup>o</sup> )
Crappie							405	12		
Crevalle							24	1		
Croaker	469	10	857	21	16, 014	278	4, 675	50		
Cunner	76	2								
Cusk	5, 173	67	135	2						
Dolphin							12	( <sup>o</sup> )		
Drum:										
Black	( <sup>o</sup> )	( <sup>o</sup> )	( <sup>o</sup> )	( <sup>o</sup> )	64	1	1, 077	21		
Red or redfish			48	1	39	1	2, 083	78		
Eels	961	57	738	75	335	21	65	2	( <sup>o</sup> )	( <sup>o</sup> )
Flounders	37, 489	1, 129	10, 376	311	1, 288	53	1, 396	54	11, 446	435
Flyingfish									40	1
Frigate mackerel			3	( <sup>o</sup> )			2	( <sup>o</sup> )		
Garfish							( <sup>o</sup> )	( <sup>o</sup> )		
Gizzard shad					105	2	19	( <sup>o</sup> )		
Goosefish	2	( <sup>o</sup> )	3	( <sup>o</sup> )						
Grayfish	27	( <sup>o</sup> )	8	( <sup>o</sup> )					851	13
Groupers							3, 302	67	19	1
Grunts							51	2		
Haddock	150, 468	3, 400	7, 613	207	( <sup>o</sup> )	( <sup>o</sup> )				
Hake	16, 942	209	303	5	31	1	10	( <sup>o</sup> )	29	( <sup>o</sup> )
Halibut	2, 417	257	45	6					24, 787	1, 112
Hardhead									111	8
Harvestfish or "starfish"					102	3	1, 077	12		
Herring, sea	38, 074	157	656	4					1, 549	17
Herring smelt	4	( <sup>o</sup> )								
Hickory shad					59	1	166	6		
Hogfish	3	( <sup>o</sup> )					30	1		
Horse mackerel									536	14
Jewfish							38	1		
Kingfish (California)									448	11
Kingfish or "king mackerel"							3, 301	120		
King whiting or "kingfish"	7	( <sup>o</sup> )	178	10	33	1	652	13		
Ladyfish							3	( <sup>o</sup> )		
Launce	24	1	37	( <sup>o</sup> )						
"Lingcod"									1, 528	42
Mackerel	60, 088	962	740	27	26	1			12, 474	95
Marlin									25	1
Menhaden	54	1	43, 194	73	195, 486	653	89, 346	132		
Minnows	6	( <sup>o</sup> )	3	1						
Mojarro							36	1		
Mullet			215	3	48	2	25, 087	417	23	1
Mummichog	4	( <sup>o</sup> )	110	7						
Muttonfish							203	9		
Paddlefish							1	( <sup>o</sup> )		
Permit							3	( <sup>o</sup> )		
Pigfish			1	( <sup>o</sup> )	33	1	129	2		
Pike or pickerel (jacks)	1	( <sup>o</sup> )	( <sup>o</sup> )		18	3	5	( <sup>o</sup> )		
Pilehard			1						312, 172	825
Pilotfish			1	( <sup>o</sup> )						
Pinfish							295	2		
Pollock	10, 635	103	662	11	( <sup>o</sup> )	( <sup>o</sup> )				
Pompano			( <sup>o</sup> )	( <sup>o</sup> )			590	81	10	3
Porgies							26	1		
Porkfish							( <sup>o</sup> )	( <sup>o</sup> )		
Rock bass									437	21
Rockfishes									5, 967	181
Rosefish	125	2	7	( <sup>o</sup> )						
Rudderfish									37	2
Sablefish									2, 725	63
Salmon:										
Atlantic	36	9								
Blueback, red or sockeye									6, 904	397
Chinook or king									33, 094	1, 350
Chum or keta									15, 846	126
Humpback or pink									69	1
Silver or coho									20, 176	520
Sculpin									90	6
Scup	4, 458	114	7, 516	88	1, 748	47	254	6		
Sea bass	3, 607	95	3, 353	103	960	28	704	24	473	17
Sea bass, white (California)									807	61

\* Less than 500 pounds or dollars.

*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>FISH—continued</b>										
Sea robin.....	116	1	32	( <sup>o</sup> )						
Shad.....	232	13	643	68	6,515	580	1,882	239	1,889	41
Sharks.....	245	2	21	( <sup>o</sup> )			5,051	12		
Sheepshead, salt-water.....							673	14	90	2
Silver perch.....					21	( <sup>o</sup> )				
Silversides.....			173	6						
Skates.....	949	7	79	1	1	( <sup>o</sup> )			292	5
Smelts.....	277	38	( <sup>o</sup> )	( <sup>o</sup> )					2,829	76
Snapper:										
Mangrove.....							96	2		
Red.....			6	( <sup>o</sup> )			6,359	315		
Snook.....							323	8		
Spanish mackerel.....			8	1	63	4	6,465	216	11	1
Splittail.....									24	1
Spot.....	22	( <sup>o</sup> )	154	3	801	24	1,679	20		
Squawfish.....									2	( <sup>o</sup> )
Squeteagues or "sea trout":										
Gray.....	132	9	9,088	211	13,780	339	3,992	74		
Spotted.....	2	( <sup>o</sup> )				6	6,239	298		
Steelhead trout.....									2,459	61
Striped bass.....	42	7	52	8	1,028	128	507	55	556	47
Sturgeon.....	8	1	11	2	5	1	45	6	76	2
Suckers.....	138	6	122	7	1	( <sup>o</sup> )	( <sup>o</sup> )	( <sup>o</sup> )	6	( <sup>o</sup> )
Sunfish.....			2	( <sup>o</sup> )			718	18		
Surffishes.....									253	10
Swellfish.....	( <sup>o</sup> )	( <sup>o</sup> )								
Swordfish.....	4,548	485	70	8					663	58
Tautog.....	446	19	161	5	( <sup>o</sup> )	( <sup>o</sup> )				
Tempounder.....							80	1		
Thimble-eyed mackerel.....			68	1	12	( <sup>o</sup> )				
Tilefish.....	249	10	1,870	50						
Tomcod.....	56	1	24	1					4	( <sup>o</sup> )
Tripletail.....							2	( <sup>o</sup> )		
Tuna and tunalike fishes:										
Albacore.....									620	31
Bluefin or horse mackerel.....	256	12	59	3			3	( <sup>o</sup> )	1,071	51
Bonito.....									2,862	53
Skipjack or striped.....									21,637	751
Yellowfin.....									36,923	1,505
Turbot.....							4	( <sup>o</sup> )		
Whitebait.....			7	1					134	6
Whitefish.....									162	8
White perch.....	54	6	253	14	642	26	832	21		
Whiting.....	7,201	61	2,705	31						
Wolfish.....	1,933	29	25	( <sup>o</sup> )						
Yellow perch.....	16	1	15	1	185	11	180	5		
Yellowtail.....							92	4	1,796	51
Miscellaneous fish.....									166	4
<b>Total.....</b>	<b>440,918</b>	<b>9,184</b>	<b>112,302</b>	<b>1,938</b>	<b>267,107</b>	<b>2,548</b>	<b>184,158</b>	<b>2,715</b>	<b>542,859</b>	<b>8,416</b>
<b>SHELLFISH, ETC.</b>										
Abalone.....									563	77
Clams:										
Cockle.....	238	16							37	9
Coquina.....							5	( <sup>o</sup> )		
Hard.....	3,459	422	2,271	355	1,512	352	1,387	61	406	20
Pismo.....									27	7
Razor.....	401	17							559	115
Soft.....	10,145	472	1,196	62					61	14
Surf.....	55	3	489	25						
Mixed.....									15	2
Conchs.....			39	3			1	( <sup>o</sup> )		
Crabs:										
Hard.....	1,097	55	777	24	56,423	582	8,484	89	4,820	299
King.....			3,501	7						
Soft.....	1	( <sup>o</sup> )	85	11	5,089	320	413	60		
Stone.....							154	8		
Crawfish.....									80	6
Lobsters:										
Common.....	10,279	1,913	878	166	( <sup>o</sup> )					
Spiny.....							446	32	1,018	142

\* Less than 500 pounds or dollars.

*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>SHELLFISH, ETC.—continued</b>	63	4	113	8					( <sup>9</sup> )	( <sup>9</sup> )
Mussels, sea.....							1	( <sup>9</sup> )	59	3
Octopus.....										
Oysters:										
Eastern, market, public.....	44	7	303	37	18,168	1,251	11,382	448		
Eastern, market, private.....	7,343	1,196	14,724	1,726	9,722	765	4,368	264	42	14
Western, market.....									270	139
Japanese, market.....									2,103	129
Periwinkles.....	77	3	1	( <sup>9</sup> )						
Scallops:										
Bay.....	1,537	402	393	42	659	80	153	14	7	2
Sea.....	1,572	194	1,772	140	( <sup>9</sup> )	( <sup>9</sup> )				
Shrimp.....	( <sup>9</sup> )	( <sup>9</sup> )	117	27			88,262	2,036	2,729	44
Squid.....	3,110	42	2,220	34	323	6	8	( <sup>9</sup> )	4,230	30
Terrapin.....			1	( <sup>9</sup> )	3	1	23	4		
Turtles.....	1	( <sup>9</sup> )	8	( <sup>9</sup> )	1	( <sup>9</sup> )	58	( <sup>9</sup> )	6	( <sup>9</sup> )
Frogs.....							1			
Irish moss.....	84	4								
Sponges.....							613	697		
Bloodworms.....	59	46	32	31						
Sandworms.....	35	21	19	18						
<b>Total.....</b>	<b>39,603</b>	<b>4,817</b>	<b>28,919</b>	<b>2,716</b>	<b>91,900</b>	<b>3,357</b>	<b>115,759</b>	<b>3,713</b>	<b>17,032</b>	<b>1,052</b>
<b>WHALE PRODUCTS <sup>10</sup></b>										
Meat.....									434	10
Oil, whale.....									503	6
<b>Total.....</b>									<b>937</b>	<b>16</b>
<b>Grand total.....</b>	<b>480,521</b>	<b>14,001</b>	<b>141,221</b>	<b>4,654</b>	<b>359,007</b>	<b>5,905</b>	<b>299,917</b>	<b>6,428</b>	<b>560,828</b>	<b>9,484</b>

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>FISH</b>								
Albacore.....							18	
Alewives.....							33,936	( <sup>9</sup> ) 193
Amberjack.....							6	( <sup>9</sup> ) 3
Anchovies.....							299	156
Barracuda.....							2,931	28
Black bass.....			14	2			358	339
Bluefish.....							8,457	411
Blue pike.....	9,947	411					9,947	2
Blue runner or hardtail.....							163	32
Bonito.....							1,137	9
Bowfin.....	3	( <sup>9</sup> )	428	9			433	687
Buffalo fish.....	2	( <sup>9</sup> )	15,772	687			15,786	358
Butterfish.....							10,077	331
Burbot.....	331	4					331	10
Cabio or crab eater.....							10	( <sup>9</sup> ) 12
Cabrilla.....							340	17,131
Carp.....	4,284	118	11,892	455			17,131	636
Catfish and bullheads.....	833	46	10,267	878			16,665	1,123
Cero.....							13	1
Chubs.....	4,057	249					4,057	249
Cigarfish.....							9	( <sup>9</sup> ) 17
Cisco.....	160	17			615	3	160	2,033
Cod.....							106,142	2
Corbina.....							447	( <sup>9</sup> ) 15
Crappie.....	1	( <sup>9</sup> )	41	3			24	1
Crevalle.....								

<sup>9</sup> Less than 500 pounds or dollars.<sup>10</sup> The weight of whales caught was not determined; therefore, the weight of the manufactured products is shown.

NOTE.—The above excludes the seed-oyster fishery. See separate section following.

*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
FISH—continued								
Croaker.....							22,015	359
Cunner.....							76	2
Cusk.....							5,308	69
Dolly Varden trout.....					13	1	13	1
Dolphin.....							12	( <sup>o</sup> )
Drum:								
Black.....							1,141	22
Red or redfish.....							2,170	80
Eels.....	44	1	7	1			2,150	157
Flounders.....							61,995	1,982
Flyingfish.....							40	1
Frigate mackerel.....							5	( <sup>o</sup> )
Garfish.....			73	1			73	1
Gizzard shad.....							124	2
Goldfish.....	48	1					48	1
Goosefish.....							5	( <sup>o</sup> )
Grayfish.....							886	13
Groupers.....							3,321	63
Grunts.....							51	2
Haddock.....							158,081	3,607
Hake.....							17,315	215
Halibut.....					15,058	493	42,307	1,868
Hardhead.....							111	8
Harvestfish or "starfish".....							1,179	15
Herring:								
Lake.....	11,686	181					11,686	181
Sea.....					127,578	548	167,857	726
Herring smelt.....							4	( <sup>o</sup> )
Hickory shad.....							225	7
Hogfish.....							33	1
Horse mackerel.....							536	14
Jewfish.....							38	1
Kingfish (California).....							448	11
Kingfish or "king mackerel".....							3,301	120
King whiting or "kingfish".....							870	24
Ladyfish.....							3	( <sup>o</sup> )
Lake trout.....	10,662	920					10,662	920
Launce.....							61	1
"Lingcod".....							1,528	42
Mackerel.....							73,328	1,085
Marlin.....							25	1
Menhaden.....							328,080	859
Minnows.....			1	( <sup>o</sup> )			10	1
Mojarro.....							36	1
Mooneye.....	16	( <sup>o</sup> )	3	( <sup>o</sup> )			19	( <sup>o</sup> )
Mullet.....							25,373	423
Mummichog.....							114	7
Muttonfish.....							203	9
Paddlefish.....			951	43			952	43
Permit.....							3	( <sup>o</sup> )
Pigfish.....							163	3
Pike or pickerel (jacks).....	373	16	5	1			402	20
Pilchard.....							312,172	825
Pilotfish.....							1	( <sup>o</sup> )
Pinfish.....							295	2
Pollock.....							11,297	114
Pompano.....							600	84
Porgies.....							26	1
Porkfish.....							( <sup>o</sup> )	( <sup>o</sup> )
Quillback.....			269	11			269	11
Rock bass.....	17	1					454	22
Rockfishes.....					4	( <sup>o</sup> )	5,971	181
Rosefish.....							132	2
Rudderfish.....							37	2
Sablefish.....					128	2	2,853	65
Salmon:								
Atlantic.....							36	9
Blueback, red or sockeye.....					188,294	3,014	195,198	3,411
Chinook or king.....					16,393	254	49,487	1,604
Chum or keta.....					86,175	611	102,021	737
Humpback or pink.....					144,943	1,695	145,012	1,696
Silver or coho.....					16,732	192	36,908	712

\* Less than 500 pounds or dollars.

*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
<b>FISH—continued</b>								
Sauger	3,448	135					3,450	136
Sculpin							90	6
Scup							13,976	255
Sea bass							9,097	267
Sea bass, white (California)							807	61
Sea robin							148	1
Shad							11,161	941
Sharks							5,317	14
Sheepshead:								
Fresh-water	2,158	44	3,905	143			6,063	187
Salt-water							763	16
Silver perch							21	( <sup>9</sup> )
Silversides							173	9
Skates							1,321	13
Smelts	98	3			7	( <sup>9</sup> )	3,211	117
Snapper:								
Mangrove							96	2
Red							6,365	315
Snook							323	8
Spanish mackerel							6,547	222
Splittail							24	1
Spot							2,656	47
Squawfish							2	( <sup>9</sup> )
Squeteagues or "sea trout":								
Gray							26,992	633
Spotted							6,330	304
Steelhead trout	5	1			3	( <sup>9</sup> )	2,467	62
Striped bass							2,185	245
Sturgeon	30	6					175	18
Sturgeon, shovelnose			87	8			87	8
Suckers	6,192	137	315	13			6,774	163
Sunfish	8	( <sup>9</sup> )	22	1			750	19
Surffishes							253	10
Swellfish							( <sup>9</sup> )	( <sup>9</sup> )
Swordfish							5,281	551
Tautog							607	24
Tenpounder							80	1
Thimble-eyed mackerel							80	1
Tilefish							2,119	60
Tomcod							84	2
Tripletail							2	( <sup>9</sup> )
Tullibee	1,297	16					1,297	16
Tuna and tunalike fishes:								
Albacore							620	31
Bluefin or horse mackerel							1,389	66
Bonito							2,862	53
Skipjack or striped							21,637	751
Yellowfin							36,923	1,505
Turbot							4	( <sup>9</sup> )
White bass	253	10	3	( <sup>9</sup> )			256	10
Whitebait							141	7
Whitefish	9,730	1,045					9,892	1,053
Whitefish, Menominee	233	17					233	17
White perch							1,781	67
Whiting							9,906	92
Wolfish							1,958	29
Yellow perch	11,472	467					11,868	485
Yellow pike	4,441	458	5	1			4,446	459
Yellowtail							1,888	55
Miscellaneous fish							166	4
<b>Total</b>	<b>81,829</b>	<b>4,304</b>	<b>44,062</b>	<b>2,258</b>	<b>595,943</b>	<b>6,813</b>	<b>2,269,178</b>	<b>38,176</b>
<b>SHELLFISH, ETC.</b>								
Abalone							563	77
Clams:								
Cockle							275	25
Coquina							5	( <sup>9</sup> )
Hard					2	( <sup>9</sup> )	9,037	1,210
Pismo							27	7
Razor					1,755	89	2,718	221
Soft							11,402	548
Surf							544	28
Mixed							15	2

<sup>9</sup> Less than 500 pounds or dollars.



*Fisheries of the United States and Alaska, 1932—Continued*

## CATCH: BY SECTIONS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
SHELLFISH, ETC.—continued							40	3
Conchs.....								
Crabs:								
Hard.....					609	46	72, 210	1, 095
King.....							3, 501	7
Soft.....							5, 588	391
Stone.....							154	8
Crawfish.....	20	1	29	( <sup>9</sup> )			129	7
Lobsters:								
Common.....							11, 157	2, 079
Spiny.....							1, 464	174
Mussels, sea.....							176	12
Mussel shells.....	1, 895	26	37, 254	422			39, 149	448
Octopus.....							60	3
Oysters:								
Eastern, market, public.....							29, 897	1, 743
Eastern, market, private.....							36, 199	3, 965
Western, market.....							270	139
Japanese, market.....							2, 103	129
Periwinkles.....							78	3
Scallops:								
Bay.....							2, 749	540
Sea.....							3, 344	334
Shrimp.....			49	4	547	23	91, 704	2, 134
Squid.....							9, 871	112
Terrapin.....			19	( <sup>9</sup> )			46	5
Turtles.....			94	3			168	3
Frogs.....			875	131			876	131
Irish moss.....							84	4
Sponges.....							613	697
Bloodworms.....							91	77
Sandworms.....							54	39
Pearls and slugs.....		1		80				81
Total.....	1, 915	28	38, 320	640	2, 913	158	336, 361	16, 481
WHALE PRODUCTS <sup>10</sup>								
Meal.....					2, 090	14	2, 524	24
Oil:								
Sperm.....					54	1	54	1
Whale.....					5, 520	76	6, 023	82
Total.....					7, 664	91	8, 601	107
Grand total.....	83, 744	4, 332	82, 382	2, 898	606, 520	7, 062	2, 614, 140	54, 764

<sup>9</sup> Less than 500 pounds or dollars.<sup>10</sup> The weight of whales caught was not determined; therefore, the weight of the manufactured products is shown.

NOTE.—The above excludes the seed-oyster fishery. See separate section following.

## CATCH: BY STATES

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

State	Marine and coastal rivers		Mississippi River and tributaries		Lakes <sup>11</sup>		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alabama.....	6, 107	169	1, 822	33			7, 929	202
Arkansas.....			15, 733	412			15, 733	412
California.....	442, 883	5, 377					442, 883	5, 377
Connecticut.....	21, 046	1, 111					21, 046	1, 111
Delaware.....	3, 729	101					3, 729	101
Florida.....	101, 920	2, 917			1, 370	56	103, 290	2, 973
Georgia.....	16, 523	186					16, 523	186
Illinois.....			14, 262	367	885	58	15, 147	425
Indiana.....			7, 718	157	630	37	8, 348	194

<sup>11</sup> Includes Lake Ontario, Lake Erie, Lake Huron, Lake Michigan, Lake Superior, Rainy Lake, Namakan Lake, Lake of the Woods, Lake Okeechobee, and several mussel-bearing streams tributary to Lakes Huron, Erie, and Michigan.

*Fisheries of the United States and Alaska, 1922—Continued*

## CATCH BY STATES—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

State	Marine and coastal rivers		Mississippi River and tributaries		Lakes		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Iowa.....			7,778	303			7,778	303
Kansas.....			455	17			455	17
Kentucky.....			1,622	61			1,622	61
Louisiana.....	48,340	1,181	19,213	994			67,553	2,175
Maine.....	90,602	2,413					90,602	2,413
Maryland.....	61,626	1,940					61,626	1,940
Massachusetts.....	347,593	8,928					347,593	8,928
Michigan.....					30,130	2,162	30,130	2,162
Minnesota.....			3,498	138	8,507	199	12,005	337
Mississippi.....	20,603	497	2,650	123			23,253	620
Missouri.....			928	77			928	77
Nebraska.....			145	16			145	16
New Hampshire.....	744	58					744	58
New Jersey.....	72,595	2,218					72,595	2,218
New York.....	64,866	2,333			1,435	112	66,301	2,445
North Carolina.....	86,214	827					86,214	827
Ohio.....			185	7	28,515	1,161	28,700	1,168
Oklahoma.....			40	4			40	4
Oregon.....	22,986	729					22,986	729
Pennsylvania.....	31	2			2,535	110	2,566	112
Rhode Island.....	20,536	1,491					20,536	1,491
South Carolina.....	4,536	123					4,536	123
South Dakota.....			114	11			114	11
Tennessee.....			3,435	104			3,435	104
Texas.....	14,304	472	139	6			14,443	478
Virginia.....	297,381	3,965					297,381	3,965
Washington.....	94,959	3,378					94,959	3,378
Wisconsin.....			2,645	68	11,107	493	13,752	561
Alaska.....	606,520	7,062					606,520	7,062
Total.....	2,446,644	47,478	82,382	2,898	85,114	4,388	2,614,140	54,764

## SEED OYSTER FISHERY

Item	New England		Middle Atlantic	
OPERATING UNITS				
Fishermen:	Number		Number	
On vessels.....	79		1,742	
On boats and shore:				
Regular.....	16		390	
Casual.....	172		190	
Total.....	267		2,322	
Vessels:				
Steam.....	4			
Net tonnage.....	344			
Motor.....	13		19	
Net tonnage.....	140		226	
Sail.....	3		152	
Net tonnage.....	23		3,036	
Total vessels.....	20		171	
Total net tonnage.....	507		3,262	
Boats:				
Motor.....	6		273	
Other.....	112		176	
Apparatus:				
Dredges, oyster.....	97		334	
Yards at mouth.....	88		397	
Tongs.....	129		537	
Rakes.....	51		50	
CATCH				
Oysters:	Bushels	Value	Bushels	Value
Seed, public, spring.....	29,164	\$15,840	1,250,691	\$425,554
Seed, public, fall.....	43,472	19,900	35,021	10,661
Seed, private, spring.....	136,356	74,445	21,113	19,833
Seed, private, fall.....	20,200	9,600	24,965	24,965
Total.....	229,192	119,785	1,331,790	481,013

*Fisheries of the United States and Alaska, 1932—Continued*

## SEED OYSTER FISHERY—Continued

Item	Chesapeake		South Atlantic and Gulf		Total	
OPERATING UNITS						
Fishermen:	Number		Number		Number	
On vessels.....					1,821	
On boats and shore:						
Regular.....	1,300		12		1,718	
Casual.....	447				809	
Total.....	1,747		12		4,348	
Vessels:						
Steam.....					4	
Net tonnage.....					344	
Motor.....					32	
Net tonnage.....					366	
Sail.....					155	
Net tonnage.....					3,059	
Total vessels.....					191	
Total net tonnage.....					3,769	
Boats:						
Motor.....	746		6		1,031	
Other.....	184				472	
Apparatus:						
Dredges, oyster.....			12		443	
Yards at mouth.....			12		497	
Tongs.....	1,391				2,057	
Rakes.....	86				187	
CATCH						
Oysters:	Bushels	Value	Bushels	Value	Bushels	Value
Seed, public, spring.....	565,005	\$68,575	39,741	\$8,280	1,884,601	\$518,249
Seed, public, fall.....	897,048	89,025			975,541	119,586
Seed, private, spring.....	13,000	1,040			170,469	95,318
Seed, private, fall.....					45,165	34,565
Total.....	1,475,053	158,640	39,741	8,280	3,075,776	767,718

NOTE.—Of the number of persons fishing for seed oysters, 159 in the New England States, 1,537 in the Middle Atlantic States, 1,609 in the Chesapeake States and all in the South Atlantic and Gulf States—a total of 3,317 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 100 boats other than motor, 112 tongs and all the rakes in the New England States; 93 vessels, 262 motor boats, 165 other boats, 176 dredges, 527 tongs and 47 rakes in the Middle Atlantic States; 692 motor boats, 172 other boats, 1,291 tongs and all the rakes in the Chesapeake States; and all craft and gear in the South Atlantic and Gulf States—a total of 93 vessels, 960 motor boats, 437 other boats, 188 dredges, 1,930 tongs, and 184 rakes.

*Yield of the fisheries of the United States, 1932: By gear<sup>1</sup>*

Gear	New England		Middle Atlantic		Chesapeake	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Purse seines.....	62,858,926	\$790,711	45,176,110	\$112,226	194,046,499	\$651,400
Haul seines.....	787,520	30,597	2,674,156	75,346	3,257,274	127,939
Gill nets.....	19,028,727	419,993	2,723,403	129,382	2,317,619	177,664
Lines.....	97,374,488	2,176,389	11,177,435	303,097	45,642,755	457,240
Pound nets.....	15,837,690	226,453	27,753,844	554,907	61,672,014	1,405,072
Floating traps.....	9,777,795	179,897	232,062	5,379		
Weirs.....	19,113,722	79,862	1,437,000	2,926		
Stop nets.....			143,587	14,565	27,343	1,209
Fyke nets.....	210,834	9,721	1,428,320	33,331	783,253	34,618
Dip nets.....	4,634,504	46,683	58,321	7,670	6,109,662	282,439
Cast nets.....			2,100	228		
Seap nets.....			151,198	8,221		
Bag nets.....	81,283	7,604				
Drag nets.....			116,000	19,142		
Push nets.....	66,528	16,587				
Pocket nets.....	1,000	120				
Otter trawls.....	209,054,097	4,729,013	23,120,463	653,201	5,057,405	142,241
Traps.....	101,200	1,276				

<sup>1</sup> All figures are for 1932 except those for the Mississippi River and tributaries, which are for 1931.

## Yield of the fisheries of the United States, 1932: By gear—Continued

Gear	New England		Middle Atlantic		Chesapeake	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Pots.....	11,964,238	\$2,009,039	2,813,094	\$239,796	284,333	\$18,059
Harpoons.....	4,629,021	488,335	69,906	8,291		
Spears.....	210,111	15,093	163,899	20,557		
Scrapes, crab.....					1,506,357	52,758
Dredges.....	11,110,609	1,814,861	17,965,769	1,957,372	15,696,536	671,414
Tongs.....	1,550,221	232,692	1,847,512	280,136	21,145,406	1,687,776
Rakes.....	1,185,515	143,986	1,857,472	112,490	1,019,244	112,278
Forks.....	2,773,693	268,506	476,376	76,859		
Hoes.....	8,057,960	306,653	668,240	25,965		
Grabs.....			100	5		
Picks.....					236,960	63,165
By hand.....	111,199	7,225	164,778	12,883	204,834	19,627
Total.....	480,520,881	14,001,296	141,221,145	4,653,975	359,007,494	5,904,989

Gear	South Atlantic and Gulf		Pacific		Lakes	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Purse seines.....	89,971,248	\$163,404	238,093,610	\$1,476,067		
Haul seines.....	24,175,742	602,678	3,759,436	124,211	4,538,616	\$129,882
Gill nets.....	38,137,303	943,195	30,220,589	936,156	32,046,421	1,709,171
Trammel nets.....	3,159,789	118,055	668,367	46,512	205,545	4,140
Lines.....	25,218,356	764,227	119,795,559	4,264,625	2,307,481	206,357
Pound nets.....	10,763,098	190,839	13,993,604	549,142	9,207,975	466,941
Weirs.....	2,000	20	723,190	10,848		
Wheels.....	263,000	1,505	529,022	20,348		
Stop nets.....	891,793	15,055				
Fyke nets.....	345,520	10,661	278,053	28,538	3,425,469	161,008
Dip nets.....	491,388	27,215	1,480,485	35,929		
Cast nets.....	108,932	3,994				
Bag nets.....			1,300,416	19,506		
Drag nets.....			141,138	4,507		
Reef nets.....			22,846	2,883		
Lampara nets.....			124,030,670	460,664		
Paranzella nets.....			12,105,653	414,329		
Otter trawls.....	87,089,274	2,016,418	79,365	1,750		
Beam trawls.....			1,770,993	34,581		
Traps.....			6,126,457	454,925	30,098,291	1,626,039
Pots.....	1,117,738	50,446			19,677	984
Harpoons.....			1,624,719	75,672		
Spears.....	155,803	9,036				
Dredges.....	7,373,518	297,347				
Tongs.....	6,049,736	368,583	3,520,850	3,447,735		
Crowfoot bars.....					1,468,430	21,071
Rakes.....	312,476	20,913				
Forks.....	281,340	11,356				
Grabs.....	2,693,154	56,533				
Picks.....					246,966	3,647
Hooks.....	335,203	234,967				
Diving apparatus, abalone, or sponge.....	278,824	462,077	563,469	77,386		
By hand.....	701,493	59,861			179,518	2,536
Total.....	299,916,728	6,428,385	560,828,471	9,484,314	83,744,389	4,331,776

Gear	Mississippi River and tributaries		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Purse seines.....			630,146,393	\$3,193,808
Haul seines.....			52,932,401	1,665,194
Gill nets.....	13,739,657	\$574,541	124,640,660	4,322,108
Trammel nets.....	166,598	6,547	5,167,907	244,322
Lines.....	1,134,206	75,615	311,656,111	8,944,180
Pound nets.....	10,140,037	772,245	139,452,500	3,402,895
Floating traps.....	224,275	9,541	10,009,857	185,276
Weirs.....			21,275,912	93,656
Wheels.....			792,022	21,853
Stop nets.....			1,062,723	30,919
Fyke nets.....	18,507,204	797,130	24,978,653	1,075,007
Dip nets.....	30,045	3,307	12,804,405	403,243
Cast nets.....			111,032	4,222
Scap nets.....			151,198	8,221
Bag nets.....			1,381,699	27,110

<sup>2</sup> Includes shovels, rakes, and dredges.<sup>4</sup> Includes coquina scoops.

*Yield of the fisheries of the United States, 1932: By gear—Continued*

Gear	Mississippi River and tributaries		Total	
	Pounds	Value	Pounds	Value
Drag nets.....			257,138	\$23,649
Push nets.....			66,528	16,587
Pocket nets.....			1,000	120
Reef nets.....			22,846	883
Lampara nets.....			124,030,670	460,664
Paranzella nets.....			12,105,633	414,329
Otter trawls.....			324,400,604	7,542,623
Beam trawls.....			1,770,993	34,581
Traps.....	77,751	\$4,215	36,403,699	2,086,455
Pots.....	2,232,704	22,062	16,431,784	2,340,386
Harpoons.....			6,323,646	572,298
Spears.....	2,250	270	532,063	44,956
Scrapes, crab.....			1,506,357	52,758
Dredges.....	3,699,100	40,958	55,845,532	4,781,952
Tongs.....	1,601,876	21,091	35,715,601	3,038,013
Crowfoot bars.....	20,893,550	265,443	22,361,980	286,514
Rakes.....	370,130	4,029	3,744,837	393,696
Forks.....	4,812,737	76,214	8,344,146	432,935
Hoes.....			8,726,200	332,618
Grabs.....	873,099	130,621	3,566,353	187,159
Picks.....			483,926	66,812
Hooks.....			335,203	234,967
Diving apparatus, abalone, or sponge.....			842,293	539,463
By hand.....	5,877,304	93,528	7,239,126	195,660
Total.....	82,382,523	2,897,357	2,007,621,631	47,702,092

<sup>2</sup> Includes baskets.

### CANNED FISHERY PRODUCTS AND BYPRODUCTS TRADE

The output of canned fishery products and byproducts in the United States and Alaska in 1932 was valued at \$56,215,577. Of the total, canned products comprised \$43,749,182, and byproducts, \$12,466,395, a decrease of 31 percent in the value of canned products and 25 percent in the value of byproducts when compared with the respective values of the same groups for the previous year.

Fishery products were canned at 343 establishments in the United States and Alaska during 1932. The combined output of these canneries amounted to 10,494,606 standard cases. The net weight of the products canned amounted to 416,062,406 pounds.

Canned fishery products or byproducts were prepared in 27 States and Alaska during 1932. Alaska ranked first in the value of these products, accounting for 41 percent of the total; and California ranked second with 19 percent.

#### *Canned fishery products and byproducts of the United States and Alaska, 1932*

##### SUMMARY OF PRODUCTION: BY COMMODITIES

Product	Number of plants	Standard cases	Pounds	Value
Canned products:				
Salmon—				
United States.....	35	654,460	31,414,080	\$4,744,162
Alaska.....	87	5,254,509	252,216,432	21,715,918
Sardines—				
Maine.....	13	545,697	13,642,425	1,370,050
California.....	19	953,981	45,791,088	2,358,399
Tuna and tunalike fishes.....	15	1,206,177	28,948,248	6,183,019
Alewives.....	3	11,820	567,360	24,950
Alewife roe.....	24	21,592	1,036,416	77,716
Shad roe.....	11	1,945	93,360	51,915

*Canned fishery products and byproducts of the United States and Alaska, 1932—*  
Continued

## SUMMARY OF PRODUCTION: BY COMMODITIES—Continued

Product	Number of plants	Standard cases	Pounds	Value
<b>Canned products—Continued.</b>				
Mackerel.....	10	94, 723	4, 546, 704	\$253, 572
Fish flakes.....	5	12, 552	602, 496	104, 575
Fish cakes, balls, etc.....	6	64, 556	3, 098, 688	463, 107
Cat and dog food.....	6	117, 255	5, 628, 240	286, 455
Salmon roe and caviar.....	5	4, 288	205, 824	28, 166
Sturgeon caviar.....	6	2, 541	121, 968	330, 149
Whitefish roe and caviar.....	5	896	43, 008	34, 047
Salmon eggs (for bait).....	8	4, 204	201, 792	95, 415
Miscellaneous fish, roe, and caviar.....	16	10, 105	485, 040	60, 054
Oysters.....	40	392, 664	5, 889, 960	1, 007, 624
Shrimp.....	51	758, 106	12, 612, 551	2, 594, 980
Clam products.....	63	371, 288	1 8, 376, 870	1, 797, 002
Crabs.....	7	5, 039	241, 872	80, 581
Turtle products.....	3	3, 663	175, 824	62, 879
Miscellaneous shellfish.....	6	2, 545	122, 160	24, 447
Total.....	2 343	10, 494, 606	416, 062, 406	43, 749, 182

Product	Quantity	Value
<b>By-products:</b>		
Oyster shell products..... tons.....	307, 652	\$1, 464, 961
Fresh-water mussel shell products.....		3, 556, 260
Marine pearl-shell products.....		2, 864, 019
Scrap, meal, etc..... tons.....	101, 738	2, 406, 506
Marine animal oils..... gallons.....	12, 195, 325	1, 392, 255
Miscellaneous by-products.....		782, 394
Total.....		12, 466, 395
Grand total.....		56, 215, 577

## VALUE OF PRODUCTION: BY STATES

State	Canned products	Byproducts <sup>1</sup>	Total
Maine.....	\$1, 825, 323	\$99, 876	\$1, 925, 199
Massachusetts.....	868, 817.	1, 063, 828	1, 957, 405
Rhode Island.....		24, 760	
Connecticut.....		787, 701	787, 701
New York.....	686, 526	1, 173, 466	2, 690, 496
New Jersey.....		830, 504	
Pennsylvania.....		700, 128	700, 128
Delaware.....		6, 589	6, 586
Maryland.....	51, 828	561, 401	613, 229
Virginia.....	52, 015	918, 281	970, 296
North Carolina.....	265, 651	164, 647	489, 059
South Carolina.....		58, 761	
Georgia.....	311, 234	468, 417	972, 786
Florida.....	193, 135		
Alabama.....	240, 316	160, 007	1, 522, 305
Mississippi.....	1, 121, 982	367, 817	1, 684, 044
Louisiana.....	1, 316, 227	87, 294	352, 042
Texas, Utah, and Wisconsin.....	264, 748	67, 397	67, 397
Missouri, Illinois, and Kentucky.....		2, 499, 281	2, 499, 281
Iowa.....			
Washington.....	3, 109, 835	57, 534	5, 318, 878
Oregon.....	2, 151, 509		
California.....	9, 052, 330	1, 774, 218	10, 826, 548
Alaska.....	22, 237, 706	594, 488	22, 832, 194
Total.....	43, 749, 182	12, 466, 395	56, 215, 577

<sup>1</sup> "Cutout" or "drained" weights of can contents are included for whole and minced clams, and gross can contents for chowder, bouillon, broth, juice, and cocktail.

<sup>2</sup> Exclusive of duplication.

<sup>3</sup> Includes menhaden, fresh-water mussel-shell products, and marine pearl-shell products.

## Pack of canned salmon—Standard cases

Product	Alaska							
	Southeast		Central		Western		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Chinook or king:								
1-pound tall.....	18,424	\$81,800	14,436	\$62,029	10,153	\$43,931	43,013	\$187,760
1-pound flat.....	4,691	27,423	8,121	61,060	1,988	13,062	14,800	101,545
½-pound flat.....	509	4,684	9,745	73,647	1,459	11,672	11,713	90,003
Total.....	23,624	113,907	32,302	196,736	13,600	68,665	69,526	379,308
Blueback, red or sockeye:								
1-pound tall.....	111,243	593,185	572,260	3,039,034	1,296,347	7,286,064	1,979,850	10,918,283
1-pound flat.....	13,421	91,263	54,495	353,140	7,608	47,943	75,524	492,346
½-pound flat.....	14,278	110,802	33,406	278,254	23	184	47,707	389,240
Total.....	138,942	795,250	660,161	3,670,428	1,303,978	7,334,191	2,103,081	11,799,869
Silver or coho:								
1-pound tall.....	81,852	334,789	60,655	244,066	463	1,882	142,970	580,737
1-pound flat.....	1,763	8,815					1,763	8,815
½-pound flat.....	3,423	21,540	19	123			3,442	21,663
Total.....	87,038	365,144	60,674	244,189	463	1,882	148,175	611,215
Humpback or pink:								
1-pound tall.....	1,372,259	4,331,866	723,632	2,238,803	10,088	32,628	2,105,979	6,603,297
½-pound flat.....	6,747	31,787	419	1,878			7,166	33,665
Total.....	1,379,006	4,363,653	724,051	2,240,681	10,088	32,628	2,113,145	6,636,962
Chum or keta:								
1-pound tall.....	578,819	1,609,799	147,410	408,523	93,703	267,629	819,932	2,285,951
½-pound flat.....	624	2,496					624	2,496
Total.....	579,443	1,612,295	147,410	408,523	93,703	267,629	820,556	2,288,447
Steelhead:								
1-pound tall.....	26	117					26	117
Grand total.....	2,208,079	7,250,366	1,624,598	6,760,557	1,421,832	7,704,995	5,254,509	21,715,918

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon and California		Total			
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Chinook or king:								
1-pound tall.....	9,554	\$43,767	29,795	\$102,242	39,349	\$146,009	82,362	\$333,769
1-pound oval.....	241	5,061	928	19,280	1,169	24,341	1,169	24,341
1-pound flat.....	18,098	111,435	31,235	216,518	49,333	327,953	64,133	429,498
½-pound oval.....	13	286	244	5,368	257	5,654	257	5,654
½-pound flat.....	49,955	531,628	99,527	1,036,755	149,482	1,568,383	161,195	1,658,386
¾-pound flat.....	79	1,240	11,164	137,478	11,243	138,718	11,243	138,718
Total.....	77,940	693,417	172,893	1,517,641	250,833	2,211,058	320,359	2,590,366
Blueback, red or sockeye:								
1-pound tall.....	38	304			38	304	1,979,888	10,918,587
1-pound flat.....	21,426	210,659			21,426	210,659	96,950	703,005
½-pound flat.....	70,226	842,106	1,859	19,334	72,085	861,440	119,792	1,250,680
¾-pound flat.....	387	5,573			387	5,573	387	5,573
Total.....	92,077	1,058,642	1,859	19,334	93,936	1,077,976	2,197,017	12,877,845
Silver or coho:								
1-pound tall.....	19,692	78,658	2,752	121,088	22,444	199,746	165,414	780,483
1-pound flat.....	28,618	144,167	13,145	78,870	41,763	223,037	43,526	231,852
½-pound oval.....	18	126			18	126	18	126
½-pound flat.....	12,852	83,650	5,589	49,110	18,841	132,740	22,283	154,403
¾-pound oval.....	458	8,061			458	8,061	458	8,061
¾-pound flat.....	4,657	46,124	16,982	175,677	21,639	221,801	21,639	221,801
Total.....	66,295	360,766	28,868	424,745	105,163	785,511	253,338	1,396,726
Humpback or pink:								
1-pound tall.....	1,261	4,287			1,261	4,287	2,107,240	6,607,584
1-pound flat.....	96	326			96	326	96	326
½-pound flat.....	320	1,408			320	1,408	7,486	35,073
Total.....	1,677	6,021			1,677	6,021	2,114,822	6,642,983

*Pack of canned salmon—Standard cases—Continued*

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon and California		Total			
Chum or keta:	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>
1-pound tall.....	167, 571	\$469, 199	16, 305	\$42, 393	183, 876	\$511, 592	1, 003, 808	\$2, 797, 543
1-pound flat.....	13	39	22	62	35	101	35	101
½-pound flat.....	1, 167	3, 968	1, 377	4, 957	2, 544	8, 925	3, 168	11, 421
Total.....	168, 751	473, 206	17, 704	47, 412	186, 455	520, 618	1, 007, 011	2, 809, 065
Steelhead:								
1-pound tall.....	6	24	1, 023	4, 706	1, 029	4, 730	1, 055	4, 847
1-pound oval.....			30	270	30	270	30	270
1-pound flat.....	3, 829	22, 974	1, 819	10, 914	5, 648	33, 888	5, 648	33, 888
½-pound oval.....			945	13, 230	945	13, 230	945	13, 230
½-pound flat.....	1, 656	17, 161	2, 521	20, 168	4, 177	37, 329	4, 177	37, 329
¾-pound oval.....			496	7, 936	496	7, 936	496	7, 936
¾-pound flat.....			4, 071	45, 595	4, 071	45, 595	4, 071	45, 595
Total.....	5, 491	40, 159	10, 905	102, 819	16, 396	142, 978	16, 422	143, 095
Grand total.....	412, 231	2, 632, 211	242, 229	2, 111, 951	654, 460	4, 744, 162	5, 908, 969	26, 460, 080

NOTE.—“Standard cases” represent the various sized cases converted to the equivalent of 48 1-pound cans to the case. Salmon were canned at 24 plants in Washington, 9 in Oregon, 2 in California, and 87 in Alaska.

*Pack of canned sardines*

Sardines (herring)	Maine		Sardines (pilchard)	California	
Quarters, ¼-pound (100 cans):	<i>Cases</i>	<i>Value</i>	1-pound oval (48 cans):	<i>Cases</i>	<i>Value</i>
In cottonseed oil.....	450, 357	\$1, 130, 261	In tomato sauce.....	757, 293	\$1, 794, 436
In other sauces or oils.....	42, 970	120, 119	In mustard.....	81, 431	193, 154
Three-quarters, ¾-pound (48 cans):			In other sauces or oils.....	12, 029	28, 174
In mustard.....	36, 368	119, 670	¾-pound square (100 cans):		
Total.....	529, 695	1, 370, 050	In various sauces or oils....	7, 681	67, 429
Total (standard cases).....	545, 697		6-ounce (100 cans):		
			In various sauces or oils....	62, 040	150, 594
			1-pound tall (48 cans):		
			In natural oil.....	45, 087	98, 214
			Other sizes:		
			In various sauces or oils		
			(standard cases).....	5, 674	26, 398
			Total.....	971, 235	2, 358, 399
			Total (standard cases).....	953, 981	

NOTE.—“Standard cases” represent the various sized cases converted to the uniform basis of 100 ¼-pound cans to case of sardines (herring), and 48 1-pound cans to the case of sardines (pilchard). Sardines were canned at 13 plants in Maine and 19 in California.

*Pack of canned tuna and tunalike fishes in California*

Size	Albacore		Yellowfin		Bluefin		Striped	
	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>	<i>Cases</i>	<i>Value</i>
¾-pound (48 cans).....	1, 673	\$6, 132	<sup>1</sup> 79, 402	<sup>1</sup> \$292, 911	739	\$2, 240	20, 269	\$67, 441
¾-pound (100 cans).....			364	2, 184			2, 169	13, 014
½-pound (48 cans).....	48, 856	263, 887	465, 312	2, 525, 319	5, 563	28, 143	205, 945	970, 700
1-pound (48 cans).....	<sup>2</sup> 8, 185	<sup>2</sup> 81, 557	<sup>2</sup> 43, 121	<sup>2</sup> 397, 772	767	6, 762	13, 968	111, 915
Flakes (standard cases).....	7, 221	30, 348	<sup>3</sup> 93, 763	<sup>3</sup> 366, 327	2, 114	8, 592	15, 945	60, 776
Total.....	65, 935	381, 924	681, 962	3, 584, 513	9, 183	45, 737	258, 296	1, 223, 846
Total (standard cases).....	73, 284		685, 397		9, 581		262, 220	

<sup>1</sup> Includes the pack in ½-pound jars, 96 to the case, which have been converted to the equivalent of ¾-pound cans, 48 to the case.

<sup>2</sup> Includes the pack in 4-pound cans, 12 to the case, which have been converted to the equivalent of 1-pound cans, 48 to the case.

<sup>3</sup> Includes a small amount of mixed bluefin and yellowfin flakes.



*Pack of canned tuna and tunalike fishes in California—Continued*

Size	"Tonno"		Bonito		Yellowtail		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
$\frac{1}{4}$ -pound (48 cans).....	99	\$333	1,001	\$2,854	-----	-----	103,183	\$371,911
$\frac{1}{4}$ -pound (100 cans).....	108,669	673,909	7,994	48,631	-----	-----	119,196	737,738
$\frac{1}{2}$ -pound (48 cans).....	8,754	50,564	25,034	101,642	2,023	\$8,142	761,487	3,948,397
1-pound (48 cans).....	-----	-----	7,812	53,079	1,092	7,824	74,945	658,909
Flakes (standard cases).....	-----	-----	10	21	-----	-----	119,053	466,064
Total.....	117,522	724,806	41,851	206,227	3,115	15,966	1,177,864	6,183,019
Total (standard cases).....	121,993	-----	49,495	-----	4,207	-----	1,206,177	-----

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48  $\frac{1}{2}$ -pound cans to the case. Tuna and tunalike fishes were canned in 15 plants in California.

*Pack of canned alewives and alewife roe*

## STANDARD CASES

Product	Maryland		Virginia		North Carolina		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Alewives.....	11,820	\$24,950	-----	-----	-----	-----	11,820	\$24,950
Alewife roe.....	6,169	25,028	14,619	\$48,965	804	\$3,723	21,592	77,716
Total.....	17,989	49,978	14,619	48,965	804	3,723	33,412	102,666

## ACTUAL CASES

Product and size		Cases	Value
Alewives:			
16-ounce (48 cans).....		11,820	\$24,950
Alewife roe:			
7 $\frac{1}{2}$ -, 8 $\frac{1}{2}$ -, and 11-ounce (48 cans).....		3,610	7,847
10-ounce (48 cans).....		2,060	5,368
10-, 15-, and 18-ounce (24 cans).....		750	1,795
16-ounce (48 cans).....		6,219	26,114
17-ounce (24 cans).....		22,131	36,592
Total.....			77,716
Grand total.....			102,666

NOTE.—"Standard cases" represent the various sized cases converted to the equivalent of 48 1-pound cans to the case. Alewives or alewife roe were canned at 5 plants in Maryland, 17 in Virginia, and 2 in North Carolina.

*Pack of canned shrimp*

## STANDARD CASES

State	Dry pack (in tins)		Wet pack (in tins)		Wet pack (in glass) <sup>1</sup>		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
South Carolina and Alabama.....	17,668	\$62,697	45,518	\$156,575	-----	-----	63,186	\$219,272
Georgia.....	18,748	67,645	53,357	173,619	8,143	\$47,123	80,248	288,387
Florida.....	2,237	7,272	8,805	28,226	2,597	16,480	13,639	51,978
Mississippi.....	33,431	113,912	126,474	430,071	-----	-----	159,905	543,983
Louisiana.....	104,230	362,697	270,483	890,413	-----	-----	374,713	1,253,110
Texas.....	14,836	50,625	46,901	159,853	-----	-----	61,737	210,478
Louisiana and Texas.....	-----	-----	-----	-----	4,678	27,772	4,678	27,772
Total.....	191,150	664,848	551,538	1,838,757	15,418	91,375	758,106	2,594,980

<sup>1</sup> The pack of shrimp in glass for Louisiana and Texas has been grouped to avoid the disclosure of private enterprise.

## U.S. BUREAU OF FISHERIES

*Pack of canned shrimp—Continued*

## ACTUAL CASES

Size	Cases	Value
In tins, dry:		
5-ounce (48 cans) <sup>2</sup> .....	172, 885	\$587, 626
8¼-ounce (24 cans).....	20, 659	72, 552
8½-ounce (24 cans).....	1, 436	4, 670
In tins, wet:		
5¾-ounce (48 cans) <sup>3</sup> .....	548, 278	1, 825, 976
9¾-ounce (24 cans).....	3, 845	12, 781
In glass, wet:		
4- and 5¼-ounce (24 jars).....	4, 712	13, 804
5¾-ounce (24 jars).....	17, 589	50, 289
6-ounce (24 jars).....	8, 837	27, 282
Total.....		2, 594, 980

<sup>2</sup> Includes a small production packed in 4- and 4½-ounce cans, 48 to the case, which has been converted to the equivalent of 5-ounce cans, 48 to the case.

<sup>3</sup> Includes a small production packed in 4-ounce cans, 48 to the case, which has been converted to the equivalent of 5¾-ounce cans, 48 to the case.

NOTE.—“Standard cases” represent the various sized cases converted to the equivalent of 48 5-ounce cans to the case in the dry pack and 48 5¾-ounce cans to the case in the wet pack. Shrimp were canned at 1 plant in South Carolina, 6 in Georgia, 5 in Florida, 2 in Alabama, 15 in Mississippi, 17 in Louisiana, and 5 in Texas.

*Pack of canned oysters*

## STANDARD CASES

State	Cases	Value	State	Cases	Value
South Carolina.....	80, 423	\$202, 557	Louisiana.....	19, 083	59, 405
Georgia and Florida.....	14, 151	35, 725	Washington.....	9, 140	53, 683
Alabama.....	33, 416	80, 415			
Mississippi.....	236, 451	575, 839	Total.....	392, 664	1, 007, 624

## ACTUAL CASES

Size	Cases	Value	Size	Cases	Value
4-ounce (48 cans).....	33, 842	\$73, 473	8-ounce (24 cans).....	10, 542	\$22, 477
5-ounce (48 cans).....	305, 287	760, 274	10-ounce (24 cans).....	42, 887	103, 624
6-ounce (48 cans).....	721	2, 315			
7½-ounce (48 cans).....	5, 412	45, 461	Total.....		1, 007, 624

NOTE.—“Standard cases” represent the various sized cases converted to the equivalent of 48 5-ounce cans to the case. Oysters were canned at 6 plants in South Carolina, 2 in Georgia, 3 in Florida, 3 in Alabama, 15 in Mississippi, 5 in Louisiana, and 6 in Washington. The pack during the spring period (January to May 1932) amounted to 336,941 standard cases, valued at \$855,425, and that during the fall period (September to December 1932) amounted to 55,723 standard cases, valued at \$152,199. The pack during the spring period of 1931 amounted to 244,254 standard cases, valued at \$787,719, and during the fall period of 1931, 61,994 standard cases, valued at \$175,806.

*Pack of canned clams and clam products*

Item and State	Cases	Value
Razor clams (Washington, Oregon, and Alaska):		
Whole—		
No. 1, 5-ounce (48 cans).....	3, 716	\$34, 581
Other sizes (standard cases).....	1, 962	14, 075
Minced—		
½-pound, 4-ounce (48 cans).....	91, 155	577, 134
No. 1, 5-ounce (48 cans).....	10, 518	88, 332
No. 2, 10-ounce (24 cans).....	178	1, 477
Other sizes (standard cases).....	447	2, 940
Juice—		
All sizes (standard cases).....	537	1, 886
Total.....	108, 513	720, 425
Total (standard cases).....	90, 282	

*Pack of canned clams and clam products—Continued*

Item and State	Cases	Value
<b>Hard clams (Massachusetts, Rhode Island, New York, New Jersey, Florida, Washington, and Alaska):<sup>1</sup></b>		
Whole—		
1-pound, 8-ounce (48 cans).....	1,032	\$6,846
No. 2, 10-ounce (24 cans).....	2,832	17,654
No. 10, 52-ounce (6 cans).....	1,817	8,368
Other sizes (standard cases).....	2,145	10,590
Mined—		
½-pound, 4-ounce (48 cans).....	4,091	15,703
No. 1, 5-ounce (48 cans).....	986	5,380
Other sizes (standard cases).....	5,456	35,859
Chowder—		
No. 1, 10-ounce (48 cans).....	79,209	285,568
33-ounce (12 cans).....	12,457	89,625
No. 10, 102-ounce (6 cans).....	1,957	12,017
Other sizes (standard cases).....	24,219	121,331
Juice—		
No. 1, 10-ounce (48 cans).....	906	5,878
No. 10, 102-ounce (6 cans).....	1,791	6,663
Other sizes (standard cases).....	2,120	9,208
Cocktail—		
4-ounce (48 jars).....	535	2,300
Other sizes (standard cases).....	407	3,891
Broth and bouillon—		
All sizes (standard cases).....	4,279	25,002
Total.....	146,239	667,883
Total (standard cases).....	155,391	-----
<b>Soft clams (Maine and Massachusetts):</b>		
Whole—		
No. 1, 5-ounce (48 cans).....	56,791	209,786
1-pound, 8-ounce (48 cans).....	3,040	13,820
No. 2, 10-ounce (24 cans).....	10,486	30,522
Other sizes.....	3,529	15,093
Chowder—		
No. 1, 10-ounce (48 cans).....	13,331	45,653
33-ounce (24 cans).....	12,225	37,286
Other sizes (standard cases).....	7,932	37,918
Bouillon and juice—		
No. 2, 20-ounce (24 cans).....	3,117	5,900
Other sizes (standard cases).....	5,394	12,706
Total.....	115,845	408,694
Total (standard cases).....	125,615	-----
Grand total (standard cases).....	371,288	1,797,002

<sup>1</sup> Includes a small amount of coquina broth packed in Florida.

NOTE.—“Standard cases” represent the various sized cases converted to the equivalent of 48 no. 1, 5-ounce cans to the case, for whole and minced clams; and 48 no. 1, 10-ounce cans to the case, for other clam products. Razor clam products were canned at 12 plants in Washington, 4 in Oregon, and 15 in Alaska; hard clam products at 1 plant in Massachusetts, 1 in Rhode Island, 3 in New York, 1 in New Jersey, 1 in Florida, 6 in Washington, and 1 in Alaska; soft clam products, at 17 plants in Maine and 1 in Massachusetts; and coquina clam products, at 2 plants in Florida.

*Pack of miscellaneous canned fishery products*

Item	Standard cases	Value	Item	Standard cases	Value
Mackerel.....	94,723	\$253,572	Whitefish roe and caviar.....	896	\$34,047
Fish flakes <sup>1</sup> .....	12,552	104,575	Miscellaneous fish and roe <sup>2</sup> .....	10,105	60,054
Fish cakes, balls, etc.....	64,556	463,107	Crabs.....	5,039	80,581
Cat and dog food.....	117,255	286,455	Turtle products.....	3,663	62,879
Salmon roe and caviar.....	4,288	28,166	Miscellaneous shellfish <sup>4</sup> .....	2,545	24,447
Salmon eggs (for bait).....	4,204	95,415			
Shad roe.....	1,945	51,915	Total.....	324,312	1,875,362
Sturgeon caviar <sup>3</sup> .....	2,541	330,149			

<sup>1</sup> Tuna flakes are not included in this table but are included in the table for canned tuna and tunalike fishes.

<sup>2</sup> Produced principally from imported sturgeon.

<sup>3</sup> Includes shad, smoked salmon, filets, finnan haddie, fish chowder, pickled and smoked eels, tuna and noodles, spiced sea herring, carp for fish food, miscellaneous roe, etc.

<sup>4</sup> Includes clam cakes, shrimp creole, pickled mussels, conch products, terrapin products, and sea cucumber.

NOTE.—“Standard cases” represent the various sized cases converted to the equivalent of 48 1-pound cans to the case.

## U.S. BUREAU OF FISHERIES

*Production of miscellaneous byproducts*

Product	Atlantic and Gulf coasts		Pacific coast (including Alaska)		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Dried scrap:						
Alewife.....tons	705	\$17, 239			705	\$17, 239
Blue crab.....do	950	8, 570			950	8, 570
King crab.....do	342	8, 475			342	8, 475
Miscellaneous <sup>1</sup> .....do	829	19, 229			829	19, 229
Meal:						
Herring (Alaska).....do			9, 609	\$229, 906	9, 609	229, 906
Herring (Maine).....do	654	14, 456			654	14, 456
Pilchard.....do			25, 445	587, 528	25, 445	587, 528
Salmon.....do			1, 389	35, 604	1, 389	35, 604
Tuna.....do			4, 123	92, 551	4, 123	92, 551
Ground fish "white fish".....do	9, 088	363, 798			9, 088	363, 798
Shrimp.....do	513	6, 642	172	3, 440	685	10, 082
Miscellaneous <sup>2</sup> .....do	1, 179	42, 122	3, 269	69, 330	4, 448	111, 452
Miscellaneous green scrap <sup>3</sup> .....do	86	1, 035			86	1, 035
Oil:						
Alewife.....gallons	22, 590	2, 446			22, 590	2, 446
Cod and cod-liver—						
Medicinal.....do	24, 806	12, 401			24, 806	12, 401
Industrial.....do	77, 061	31, 633			77, 061	31, 633
Herring (Alaska).....do			2, 505, 709	256, 619	2, 505, 709	256, 619
Herring (Maine).....do	28, 876	3, 253			28, 876	3, 253
Pilchard.....do			5, 528, 946	704, 740	5, 528, 946	704, 740
Salmon.....do			154, 010	16, 049	154, 040	16, 049
Tuna.....do			30, 667	4, 382	30, 667	4, 382
Whale—						
Sperm.....do			7, 208	884	7, 208	884
Other.....do			801, 011	82, 879	801, 011	82, 879
Miscellaneous <sup>4</sup> .....do	5, 070	1, 806	12, 243	1, 677	17, 313	3, 483
Liquid glue.....do	<sup>5</sup> 365, 907	<sup>5</sup> 648, 461	( <sup>5</sup> )	( <sup>5</sup> )	365, 907	648, 461
Miscellaneous by-products <sup>6</sup> .....pounds	107, 017	22, 308	2, 517, 485	111, 625	2, 624, 502	133, 933
Total.....		1, 203, 874		2, 197, 214		3, 401, 088

<sup>1</sup> Includes ground fish, herring, and miscellaneous dried scrap.

<sup>2</sup> Includes blue crab, clam, salmon egg, mackerel, whale meat and bone, and miscellaneous meal.

<sup>3</sup> Includes herring pomace (Maine) and miscellaneous green scrap.

<sup>4</sup> Includes mackerel, shark, and miscellaneous fish oil.

<sup>5</sup> A quantity of liquid glue produced by 1 firm in California is included with the production of the Atlantic and Gulf coasts.

<sup>6</sup> Includes pearl essence, fish-scale ornaments, shark skins and fins, agar, and kelp products.

NOTE.—The oils produced on the Pacific coast are reported in trade gallons (7½ pounds) and those produced on the Atlantic and Gulf coasts are reported in United States gallons (about 7.74 pounds).

*Production of oyster-shell products*

State	Crushed oyster-shell for poultry feed		Oyster-shell lime		Total	
	Tons	Value	Tons	Value	Tons	Value
Rhode Island and Delaware.....	1, 035	\$10, 507	323	\$1, 281	1, 358	\$11, 788
New Jersey.....	4, 337	41, 142	1, 373	5, 732	5, 710	46, 874
Pennsylvania.....	3, 152	31, 370	822	3, 274	3, 974	34, 644
Maryland.....	28, 271	167, 838	15, 289	24, 455	43, 560	192, 293
Virginia.....	15, 508	113, 322	13, 926	62, 738	29, 434	176, 060
North Carolina and South Carolina.....	10, 415	57, 903	910	4, 137	11, 325	62, 040
Florida.....	61, 836	255, 589	1, 259	2, 238	63, 095	257, 827
Alabama and Texas.....	7, 357	38, 164	9, 475	8, 119	16, 832	46, 283
Mississippi.....	23, 131	132, 317	2, 073	787	25, 204	133, 104
Louisiana.....	79, 775	359, 863	1, 385	1, 312	81, 160	361, 175
Washington.....	<sup>2</sup> 1, 646	14, 461			1, 646	14, 461
California.....	<sup>3</sup> 21, 908	118, 014	2, 446	10, 398	24, 354	128, 412
Total.....	258, 371	1, 340, 490	49, 281	124, 471	307, 652	1, 464, 961

<sup>1</sup> Of this amount, 7,626 tons, valued at \$44,688 were reported as "burned" lime.

<sup>2</sup> This production was made from clam shells.

<sup>3</sup> Includes a small amount of crushed clam shells for poultry feed.

NOTE.—Crushed oyster-shell products were prepared at 2 plants in Rhode Island, 5 in New Jersey, 5 in Pennsylvania, 1 in Delaware, 6 in Maryland, 8 in Virginia, 3 in North Carolina, 4 in South Carolina, 3 in Florida, 2 in Alabama, 6 in Mississippi, 4 in Louisiana, 2 in Texas, and 5 in California; and clam-shell products were prepared at 1 plant in California and 4 in Washington.

*Production of fresh-water mussel-shell products*

Item	Iowa		New York		Other States		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pearl buttons.....gross.....	10,501,702	\$2,325,071	3,951,787	\$890,074	730,983	\$163,778	15,184,472	\$3,378,923
Crushed shell for poultry feed.....tons.....	6,788	53,274			490	2,790	7,278	56,064
Lime.....do.....	1,081	1,081	( <sup>1</sup> )	( <sup>1</sup> )	104	337	1,185	1,418
Other products <sup>2</sup> .....		119,855						119,855
Total.....		2,499,281		890,074		166,905		3,556,260

<sup>1</sup> A small production made in New York has been included with "Other States."

<sup>2</sup> Includes stucco, colored shells, and "pearl novelties."

NOTE.—Mussel shells utilized in the above production amounted to 27,296,000 pounds, valued at \$282,691. Shells were taken in 15 States in the Mississippi Valley and Great Lakes region. The producing States in the order of their importance were Illinois, which contributed 23 percent of the total quantity; Indiana, 22 percent; Arkansas, 15 percent; Tennessee, 11 percent; Michigan, 7 percent; Iowa, 6 percent; Kentucky, 4 percent; Minnesota, 3 percent; Texas, 3 percent; Ohio, 2 percent; Wisconsin, 1 percent; Mississippi, Alabama, Kansas, and Missouri, each less than one half of 1 percent.

*Production of marine pearl-shell products <sup>1</sup>*

Item	Maine, Massachusetts, and Connecticut		Rhode Island		New York		New Jersey	
	Gross	Value	Gross	Value	Gross	Value	Gross	Value
Pearl buttons.....	1,132,032	\$789,014			393,720	\$225,794	669,523	\$536,541
Novelties <sup>2</sup> .....		90,700		\$18,001		22,350		114,300
Total.....		879,714		18,001		248,144		650,841

Item	Pennsylvania, Maryland, and Florida		California		Total	
	Gross	Value	Gross	Value	Gross	Value
Pearl buttons.....	1,644,018	\$952,954			3,839,293	\$2,504,303
Novelties <sup>2</sup> .....		82,605		\$31,760		359,919
Total.....		1,035,559		31,760		2,864,019

<sup>1</sup> Produced principally from imported shells.

<sup>2</sup> Includes buckles, inlays for jewelry, knife handles, lamps, handles for manicure sets, ornaments, etc.

NOTE.—Marine pearl-shell products were manufactured at 1 plant in Maine, 2 in Massachusetts, 3 in Rhode Island, 6 in Connecticut, 9 in New York, 22 in New Jersey, 3 in Pennsylvania, 1 in Maryland, 3 in Florida, and 3 in California.

*Fish utilized and products of the menhaden industry*

State	Menhaden utilized	Products					
		Dry scrap and meal		Acidulated scrap		Oil	
	Number	Tons	Value	Tons	Value	Gallons	Value
New Jersey, Georgia, and Florida.....	167,324,000	7,200	\$178,413	5,096	\$54,432	853,026	\$76,460
Virginia.....	323,697,000	24,035	533,797			1,865,513	175,597
North Carolina.....	69,396,000	5,309	121,479	1,745	18,460	278,559	21,429
Total.....	560,417,000	236,544	833,689	6,841	72,892	2,997,098	273,486

<sup>1</sup> 336,250,000 pounds.

<sup>2</sup> Of this quantity 32,382 tons, valued at \$720,372, were reported as dry scrap, and 4,162 tons, valued at \$113,317, as fish meal.

NOTE.—The menhaden factories were located as follows: 2 in New Jersey, 10 in Virginia, 6 in North Carolina, 1 in Georgia, and 5 in Florida.

**PACKAGED-FISH TRADE**

In 1932 the production of fresh and frozen packaged fish in the United States amounted to 51,975,862 pounds, valued at \$5,741,418. The most important species packaged was haddock, which alone accounted for 33,401,425 pounds, valued at \$3,356,535.

*Production of fresh and frozen packaged fish in the United States, 1932*

Species	Maine		Massachusetts and Connecticut		New York	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike					136,644	\$24,939
Cod	408,117	\$63,095	5,231,076	\$524,003	2,146,500	269,486
Cusk	187,071	32,264	299,137	37,814		
Flounders, including "sole"	(1)	(1)	<sup>1</sup> 1,214,379	<sup>1</sup> 198,589	385,300	58,545
Haddock	259,616	42,898	30,478,578	2,978,840	2,568,231	320,857
Hake	247,826	39,607	1,365,433	122,037	314,500	32,400
Halibut			131,301	29,482		
Mackerel			79,976	10,643		
Pollock			501,151	35,018		
Salmon			80,075	15,692		
Wolfish			180,928	16,309		
Yellow perch					9,783	1,879
Miscellaneous <sup>4</sup>			1,028,021	95,394	1,000	250
Total	1,102,630	177,864	40,590,055	4,053,821	5,561,958	708,356

Species	Pennsylvania		Virginia and North Carolina		Florida and Alabama	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike	364,822	\$65,873				
Croaker			27,000	\$3,360		
Flounders, including "sole"			17,500	2,980		
Groupers					345,569	\$35,590
Haddock			95,000	13,940		
Sauger pike	(2)	(2)				
Snapper, red, and red rockfish					<sup>2</sup> 107,230	<sup>2</sup> 14,648
Spanish mackerel			3,800	684	28,343	5,651
Squeteague or "sea trout"			93,000	14,100	44,453	9,659
Yellow perch	52,310	9,335				
Yellow pike	(2)	(2)				
Miscellaneous <sup>4</sup>	1,101	254			47,725	9,888
Total	418,233	75,462	236,300	35,064	573,320	75,436

Species	Ohio, Illinois, Kentucky, and Wisconsin		Oregon and Washington		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike	1,390,574	\$265,146			1,892,040	\$355,958
Cod					7,785,693	856,584
Croaker					27,000	3,360
Cusk					486,208	70,078
Flounders, including "sole"			70,219	\$6,383	1,687,398	266,497
Groupers					345,569	35,590
Haddock					33,401,425	3,356,535
Hake					1,927,759	194,044
Halibut			230,000	22,940	361,301	52,422
Mackerel					79,976	10,643
Pollock					501,151	35,018
Salmon			88,000	10,400	168,075	26,092
Sauger pike	<sup>3</sup> 142,250	<sup>3</sup> 28,291	(2)	(2)	142,250	28,291
Snapper, red, and red rockfish					107,230	14,648
Spanish mackerel					32,143	6,335
Squeteague or "sea trout"					137,453	23,759
Wolfish					180,928	16,309
Yellow perch	1,519,245	262,600			1,581,338	273,814
Yellow pike	<sup>3</sup> 28,478	<sup>3</sup> 6,715			28,478	6,715
Miscellaneous <sup>4</sup>	6,600	1,620	18,000	1,320	1,102,447	108,726
Total	3,087,147	564,372	406,219	41,043	<sup>5</sup> 51,975,862	<sup>5</sup> 5,741,418

<sup>1</sup> A small amount of flounders in Maine has been included with Massachusetts and Connecticut.

<sup>2</sup> A small amount of red rockfish in Oregon has been included with Florida and Alabama.

<sup>3</sup> A small amount of sauger pike and yellow pike in Pennsylvania has been included with Ohio, Illinois, Kentucky, and Wisconsin.

<sup>4</sup> Includes bluefish, red drum or redfish, frog legs, kingfish, lake trout, "lingcod", mullet, pompano, sauger pike, sea bass, snooks, sunfish, swordfish, whitefish, and whiting.

<sup>5</sup> Of this amount 49,228,247 pounds, valued at \$5,401,887, were fillets; 35,352 pounds, valued at \$4,265, were packages; 963,687 pounds, valued at \$124,639, were steaks; 1,745,476 pounds, valued at \$209,077, were sticks; and 3,100 pounds, valued at \$1,550, were prepared by other methods. Of the total quantity of fillets prepared 35,390,632 pounds valued at \$4,285,427, were fresh; and 13,837,615 pounds, valued at \$1,116,460, were frozen. Of the packaged 22,828 pounds, valued at \$1,878, were fresh; and 12,524 pounds, valued at \$2,387, were frozen. Of the sticks 325,042 pounds, valued at \$48,831, were fresh; and 638,645 pounds, valued at \$75,808, were frozen. Of the sticks 792,699 pounds, valued at \$131,376, were fresh; and 952,777 pounds, valued at \$77,701, were frozen. There were prepared by other methods 3,100 pounds, valued at \$1,550.

NOTE.—Fish products were packaged at 8 plants in Maine; 54 in Massachusetts; 1 in Connecticut; 31 in New York; 8 in Pennsylvania; 7 in Virginia; 1 in North Carolina; 10 in Florida; 1 in Alabama; 29 in Ohio; 6 in Illinois; 1 in Kentucky; 4 in Wisconsin; 4 in Oregon; and 5 in Washington—a total of 170 plants.

FROZEN FISH TRADE<sup>2</sup>

## FISH FROZEN

In 1932 the freezing plants in the United States and Alaska, reporting their activities to the Government, packed 92,471,545 pounds of frozen fishery products. These products at the time they were held in cold-storage plants were estimated to be valued at \$7,000,000. Compared with the pack in 1931, this is a decrease of 18 percent. Over 65 percent of the pack consisted of six species or groups of fishery products. Of first importance was mackerel, with 17 percent of the total. Of next importance was the cod, haddock, haddock fillets, hake, and pollock group, with 16 percent of the total. Haddock fillets accounted for the bulk of the volume of this group. Salmon made up 12 percent of the total; halibut, 10 percent; whiting, 6 percent; and shellfish, 4 percent. Considerable quantities of sea herring, squid, croaker, cisco or lake herring, smelts, and weakfish, including southern "sea trout", also were frozen. Frozen squid and sea herring are marketed primarily for bait, although quantities of each are used for human consumption.

*Production of frozen fishery products, 1932*

## BY SPECIES AND MONTHS

Species	Month ended the 15th of—						
	January	February	March	April	May	June	July
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Bluefish (all trade sizes).....	10, 159	13, 777	4, 804	13, 194	5, 128	27, 432	27, 703
Butterfish (all trade sizes).....	12, 725	10, 289	9, 788	45, 212	62, 369	162, 540	209, 848
Catfish.....	12, 998	29, 277	6, 239	27, 572	34, 081	14, 543	27, 946
Cisco (Lake Erie).....	69, 202	-----	183	12, 935	8, 200	4, 132	18, 401
Cisco (lake herring), including bluefin, blackfin, and chub.....	66, 425	1, 821	15, 105	19, 997	71, 221	56, 111	98, 710
Cisco (tullibees, Canadian lakes).....	59, 159	42, 488	36, 310	9, 423	12, 813	6, 746	3, 795
Cod, haddock, hake, and pollock.....	252, 490	140, 950	116, 809	242, 860	161, 508	149, 865	203, 384
Croaker.....	19, 224	11, 758	7, 918	6, 678	258, 945	62, 980	60, 347
Flounders.....	18, 666	34, 393	8, 219	9, 401	56, 647	125, 951	21, 917
Haddock fillets.....	797, 402	603, 564	268, 068	1, 499, 030	1, 582, 088	913, 915	1, 073, 454
Halibut (all trade sizes).....	333, 059	204, 335	764, 259	561, 014	1, 729, 962	508, 109	1, 362, 245
Herring, sea (including alewives and bluebacks).....	187, 591	116, 543	123, 245	183, 108	1, 038, 274	345, 059	72, 703
Lake trout.....	47, 125	28, 252	18, 000	22, 379	46, 999	32, 956	42, 466
Mackerel (except Spanish).....	127, 501	155, 044	126, 437	84, 438	1, 014, 754	954, 341	2, 961, 879
Pike, blue and sauger.....	42, 571	1, 730	10, 553	128, 068	236, 849	273, 623	31, 992
Pike, yellow or wall-eyed.....	65, 120	8, 609	43, 765	9, 817	20, 053	13, 339	6, 943
Pike (including pickerel, jacks, and yellow jack).....	70, 675	79, 702	41, 556	12, 082	25, 239	15, 551	11, 686
Sablefish (black cod).....	36, 428	22, 841	42, 784	13, 731	58, 461	74, 500	182, 843
Salmon, chinook or king.....	1, 000	4, 352	2, 331	5, 458	67, 865	480, 788	707, 281
Salmon, silver or coho.....	32, 068	29, 366	30, 191	9, 939	46, 840	15, 396	158, 390
Salmon, fall and pink.....	90, 390	22, 268	41, 759	6, 265	12, 478	6, 000	1, 577
Salmon, steelhead trout.....	-----	184	41, 828	26, 761	12, 910	1, 132	92, 458
Salmon, red or sockeye <sup>1</sup> .....	60, 634	81, 139	58, 814	59, 957	184, 236	451, 979	139, 438
Scup (porgies).....	2, 516	1, 148	1, 905	-----	1, 910	159, 722	15, 963
Shad and shad roe.....	59, 905	34, 369	16, 286	5, 373	36, 108	60, 703	47, 041
Shellfish.....	372, 114	289, 064	211, 921	63, 999	215, 643	280, 727	260, 994
Smelts, eulachon, etc.....	216, 136	382, 228	207, 771	18, 199	3, 558	2, 462	13, 420
Squid.....	7, 520	15, 855	1, 443	575	902, 540	1, 376, 960	252, 539
Sturgeon and spoonbill cat.....	2, 081	4, 105	1, 084	5, 315	23, 704	39, 940	18, 788
Suckers.....	655	100	50	940	7, 381	5, 676	2, 220
Weakfish (including southern "sea trout").....	31, 516	36, 775	27, 714	2, 308	180, 101	64, 916	136, 875
Whitefish.....	60, 604	40, 577	17, 707	38, 307	19, 188	54, 400	259, 522
Whiting.....	56, 543	105, 814	113, 811	11, 800	162, 787	2, 620, 616	1, 828, 796
Miscellaneous fish.....	845, 294	620, 274	477, 513	689, 915	992, 674	909, 313	770, 467
Total.....	4, 067, 526	3, 172, 991	2, 896, 170	3, 846, 050	9, 293, 514	10, 272, 423	11, 124, 031

<sup>1</sup> Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

<sup>2</sup> The statistics in this section have been furnished by the Bureau of Agricultural Economics, Department of Agriculture.

*Production of frozen fishery products, 1932—Continued*

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	August	Septem-ber	October	Novem-ber	Decem-ber	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish (all trade sizes).....	449,510	93,766	117,542	25,747	12,249	801,011
Butterfish (all trade sizes).....	163,586	18,854	78,242	100,101	14,109	887,663
Catfish.....	22,201	17,080	31,488	61,449	34,909	319,783
Cisco (Lake Erie).....	38,604	46,142	29,454	42,694	8,809	278,756
Cisco (lake herring), including bluefin, blackfin, and chub.....	259,562	115,281	109,727	246,632	583,942	1,644,534
Cisco (tullibees, Canadian lakes).....	24,493	39,649	7,066	61,499	57,855	361,296
Cod, haddock, hake, and pollock.....	480,532	420,618	405,815	263,761	177,724	3,016,316
Croaker.....	415,307	318,471	8,300	6,933	7,312	1,184,173
Flounders.....	22,918	31,051	52,631	51,473	98,234	531,501
Haddock fillets.....	1,346,934	1,742,048	1,198,339	471,763	298,365	11,794,970
Halibut (all trade sizes).....	1,405,182	1,161,031	682,499	588,834	171,401	9,471,930
Herring, sea (including alewives and bluebacks).....	429,563	509,675	252,168	229,974	386,757	3,874,660
Lake trout.....	54,145	13,082	110,385	462,283	44,633	922,705
Mackerel (except Spanish).....	3,013,960	3,361,334	3,511,799	617,622	204,338	16,133,447
Pike, blue and sauger.....	653	32,654	47,856	66,072	90,764	963,385
Pike, yellow or wall-eyed.....	11,901	16,241	19,132	13,754	9,053	237,727
Pike (including pickerel, jacks, and yellow jack).....	9,294	9,031	14,444	30,416	7,241	326,917
Sablefish (black cod).....	187,327	255,554	390,500	206,956	24,813	1,496,738
Salmon, chinook or king.....	580,024	478,720	263,981	91,210	7,209	2,690,219
Salmon, silver or coho.....	1,576,143	1,588,444	1,229,857	815,244	76,607	5,608,515
Salmon, fall and pink.....	105,441	139,169	287,350	573,241	29,356	1,315,294
Salmon, steelhead trout.....	149,065	66,578	17,643	2,368	1,294	412,221
Salmon, red or sockeye <sup>1</sup> .....	114,578	104,483	137,761	39,123	40,067	1,472,209
Scup (porgies).....	35,150	25,221	2,898	2,179	200	248,812
Shad and shad roe.....	3,622	106,781	14,220	20,108	20,096	424,612
Shellfish.....	298,892	510,367	588,362	548,738	257,994	3,898,815
Smelts, eulachon, etc.....	7,191	16,703	10,909	43,197	157,083	1,078,857
Squid.....	131,913	29,956	29,372	51,196	5,628	2,805,497
Sturgeon and spoonbill cat.....	33,200	8,321	10,075	11,634	1,732	159,979
Suckers.....	473	2,059	4,772	4,630	470	29,426
Weakfish (including southern "sea trout").....	256,528	181,822	89,625	37,133	8,692	1,054,005
Whitefish.....	119,180	127,032	99,096	27,211	61,116	923,940
Whiting.....	269,728	124,125	61,213	112,159	177,418	5,644,810
Miscellaneous fish.....	951,803	832,541	820,971	1,101,462	1,444,595	10,456,822
Total.....	12,968,603	12,543,884	10,735,492	7,028,796	4,522,065	92,471,545

BY GEOGRAPHICAL SECTIONS AND SPECIES<sup>2</sup>

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Bluefish (all trade sizes).....	22	678	5	47	1	48	-----	801
Butterfish (all trade sizes).....	279	536	33	40	-----	-----	-----	888
Catfish.....	35	1	31	66	138	49	-----	320
Cisco (Lake Erie).....	-----	276	3	-----	-----	-----	-----	279
Cisco (lake herring), including bluefin, blackfin, and chub.....	-----	509	-----	794	342	-----	-----	1,645
Cisco (tullibees, Canadian lakes).....	38	171	3	116	33	-----	-----	361
Cod, haddock, hake, and pollock.....	2,325	233	3	72	225	1	157	3,016
Croaker.....	-----	155	851	176	-----	2	-----	1,184
Flounders.....	275	219	9	5	17	-----	6	531
Haddock fillets.....	10,779	252	32	419	151	46	116	11,795
Halibut (all trade sizes).....	240	588	51	617	111	18	7,847	9,472
Herring, sea (including alewives and bluebacks).....	2,769	207	17	488	1	14	379	3,875

<sup>1</sup> Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.<sup>2</sup> New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; Pacific—Washington, Oregon, California, and Alaska.



*Production of frozen fishery products, 1932—Continued*

## BY GEOGRAPHICAL SECTIONS AND SPECIES—Continued

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Lake trout.....	1	119		659	134	3	7	923
Mackerel (except Spanish).....	14, 280	1, 357	3	267	17	11	198	16, 133
Pike, blue and walleye.....		427		535		1		963
Pike, yellow or sail-eyed.....		61		46	131			238
Pike (including pickerel, jacks, and yellow jack).....		9		103	215			327
Sablefish (black cod).....		2		156	25		1, 314	1, 497
Salmon, chinook or king.....	79	45		17	11		2, 538	2, 690
Salmon, silver or coho.....	58	215		39	30	2	5, 265	5, 609
Salmon, fall or pink.....	64	13	2	17	24		1, 195	1, 315
Salmon, steelhead trout.....	3	28	40	1			340	412
Salmon, red or sockeye <sup>1</sup> .....	10	246	3	180	22	2	1, 009	1, 472
Scup (porgies).....	21	88	140					249
Shad and shad roe.....	110	160	3	56	3	1	92	425
Shellfish.....	543	1, 607	300	561	132	11	745	3, 899
Smelts, eulachon, etc.....	33	850	2	93	3		98	1, 079
Squid.....	1, 774	1, 018					13	2, 805
Sturgeon and spoonbill cat.....		103	3	10	13	20	11	160
Suckers.....		1		28				29
Weakfish (including southern "sea trout").....		794	259	1				1, 054
Whitefish.....	4	492	26	376	20	5	1	924
Whiting.....	4, 846	595	60		143	1		5, 645
Miscellaneous fish.....	1, 268	1, 268	1, 418	2, 510	481	1, 585	1, 927	10, 457
Total.....	39, 856	13, 323	3, 297	8, 495	2, 423	1, 820	23, 258	92, 472

## BY GEOGRAPHICAL SECTIONS AND MONTHS

[Expressed in thousands of pounds; that is, 000 omitted]

Month ended the 15th of—	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
January.....	1, 287	1, 106	157	550	282	186	500	4, 068
February.....	592	950	228	567	293	85	458	3, 173
March.....	207	635	62	410	296	53	1, 233	2, 896
April.....	1, 801	141	40	810	99	179	776	3, 846
May.....	4, 121	1, 502	341	895	70	138	2, 227	9, 294
June.....	5, 429	1, 649	267	830	111	246	1, 740	10, 272
July.....	6, 287	1, 208	202	483	95	169	2, 680	11, 124
August.....	5, 809	1, 712	719	495	108	107	4, 019	12, 969
September.....	6, 493	1, 156	426	432	61	122	3, 854	12, 541
October.....	5, 426	1, 160	129	500	155	163	3, 202	10, 735
November.....	1, 605	1, 070	168	1, 263	386	235	2, 302	7, 029
December.....	799	1, 034	558	1, 260	467	137	267	4, 522
Total.....	39, 856	13, 323	3, 297	8, 495	2, 423	1, 820	23, 258	92, 472

<sup>1</sup> Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

## HOLDINGS

During 1932 monthly holdings of frozen fish and shellfish averaged 47,714,000 pounds, which is 13 percent less than the average monthly holdings in 1931. The holdings in January were largest, amounting to 64,478,000 pounds. The holdings in February and in each of the months from August to December exceeded 50,000,000 pounds. The smallest holdings were in April, when only 25,916,000 pounds of frozen fish were in storage.

*Holdings of frozen fishery products, 1932*

## BY SPECIES AND MONTHS

Species	Month ended the 15th of—					
	January	February	March	April	May	June
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish (all trade sizes).....	911, 994	768, 158	569, 090	502, 516	445, 358	429, 705
Butterfish (all trade sizes).....	1, 311, 954	908, 759	533, 063	265, 782	242, 517	351, 967
Catfish.....	471, 838	420, 759	281, 774	187, 818	183, 003	155, 316
Cisco (Lake Erie).....	198, 597	116, 953	50, 192	14, 259	9, 065	11, 158
Cisco (lake herring), including bluefin, blackfin, and chub.....	1, 443, 836	822, 192	523, 838	255, 347	231, 813	222, 991
Cisco (tullibees, Canadian lakes).....	677, 938	664, 024	606, 979	556, 493	536, 042	521, 440
Cod, haddock, hake, and pollock.....	1, 330, 507	984, 937	507, 367	1, 030, 315	913, 864	840, 497
Croaker.....	906, 921	685, 105	371, 980	129, 572	353, 555	412, 246
Flounders.....	437, 162	376, 207	233, 079	151, 548	181, 158	244, 141
Haddock fillets.....	5, 618, 864	5, 009, 868	3, 628, 732	2, 880, 764	3, 257, 797	3, 149, 331
Halibut (all trade sizes).....	5, 956, 454	3, 718, 728	2, 875, 034	2, 476, 163	4, 052, 388	4, 399, 501
Herring, sea (including alewives and blue- backs).....	2, 627, 487	2, 127, 405	1, 569, 052	1, 278, 293	1, 968, 595	1, 895, 455
Lake trout.....	1, 128, 660	936, 916	599, 968	308, 394	315, 455	317, 929
Mackerel (except Spanish).....	8, 561, 678	6, 527, 700	4, 025, 132	1, 991, 957	2, 317, 783	3, 060, 393
Pike, blue and sauger.....	666, 253	458, 923	212, 171	209, 681	402, 122	572, 032
Pike, yellow or wall-eyed.....	382, 597	291, 769	173, 571	104, 240	128, 310	134, 872
Pike (including pickerel, jacks, and yellow jack).....	479, 812	384, 913	337, 959	262, 476	246, 959	232, 110
Sablefish (black cod).....	1, 123, 303	800, 660	636, 450	467, 313	420, 766	395, 807
Salmon, chinook or king.....	1, 767, 366	431, 370	128, 901	108, 365	96, 471	443, 213
Salmon, silver or coho.....	3, 015, 744	1, 764, 947	953, 469	658, 077	416, 821	267, 146
Salmon, fall and pink.....	1, 287, 569	885, 460	630, 073	549, 559	436, 934	396, 778
Salmon, steelhead trout.....	997, 685	910, 747	802, 446	685, 046	641, 732	626, 315
Salmon, red or sockeye <sup>1</sup> .....	1, 555, 002	1, 170, 552	947, 130	548, 637	607, 521	895, 864
Scup (porgies).....	369, 651	277, 047	195, 284	158, 010	132, 534	299, 765
Shad and shad roe.....	492, 634	431, 936	325, 901	255, 563	186, 643	221, 388
Shellfish.....	2, 720, 159	2, 620, 420	2, 295, 716	1, 852, 048	1, 281, 001	1, 286, 468
Smelts, eulachon, etc.....	665, 251	1, 181, 413	972, 147	265, 985	223, 891	212, 356
Squid.....	840, 343	689, 602	432, 976	176, 619	1, 027, 520	2, 364, 860
Sturgeon and spoonbill cat.....	716, 733	483, 299	763, 670	589, 837	574, 883	497, 833
Suckers.....	37, 295	12, 620	8, 910	3, 531	10, 762	14, 691
Weakfish (including southern "sea trout").....	1, 206, 059	636, 618	220, 009	83, 248	214, 038	264, 409
Whitefish.....	1, 251, 853	1, 067, 554	846, 216	511, 091	368, 366	356, 335
Whiting.....	4, 883, 795	3, 917, 506	2, 502, 503	1, 986, 570	1, 621, 107	3, 969, 426
Miscellaneous fish.....	9, 434, 788	8, 116, 202	5, 713, 328	4, 410, 522	4, 575, 352	4, 847, 184
Total.....	64, 477, 782	50, 601, 269	35, 564, 410	25, 915, 639	28, 622, 126	34, 310, 922

Species	Month ended the 15th of—					
	July	August	Septem- ber	October	Novem- ber	Decem- ber
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish (all trade sizes).....	492, 130	825, 689	769, 871	787, 107	679, 598	673, 093
Butterfish (all trade sizes).....	491, 397	620, 610	564, 252	586, 024	583, 442	445, 024
Catfish.....	161, 006	151, 201	129, 346	136, 894	171, 532	220, 321
Cisco (Lake Erie).....	41, 771	71, 903	136, 882	142, 882	279, 001	302, 796
Cisco (lake herring), including bluefin, blackfin, and chub.....	257, 483	497, 536	495, 711	557, 054	591, 776	937, 887
Cisco (tullibees, Canadian lakes).....	491, 168	596, 697	760, 068	715, 336	609, 885	604, 262
Cod, haddock, hake, and pollock.....	903, 729	1, 270, 291	1, 508, 040	1, 090, 800	1, 010, 503	934, 642
Croaker.....	458, 291	880, 094	1, 207, 274	982, 258	852, 927	776, 863
Flounders.....	229, 514	215, 295	187, 686	179, 640	179, 626	232, 015
Haddock fillets.....	3, 484, 618	3, 999, 593	4, 780, 689	4, 754, 194	3, 692, 032	2, 817, 606
Halibut (all trade sizes).....	5, 614, 215	6, 957, 557	7, 975, 140	7, 732, 624	7, 150, 616	4, 984, 651
Herring, sea (including alewives and blue- backs).....	1, 682, 081	1, 741, 288	1, 834, 665	1, 770, 782	1, 747, 253	1, 942, 034
Lake trout.....	359, 934	394, 713	349, 217	439, 745	863, 787	777, 902
Mackerel (except Spanish).....	5, 649, 791	8, 297, 979	11, 136, 686	14, 130, 518	13, 900, 718	12, 315, 010
Pike, blue and sauger.....	501, 799	407, 587	379, 681	394, 959	402, 467	448, 761
Pike, yellow or wall-eyed.....	117, 631	118, 277	128, 392	139, 474	137, 997	164, 497
Pike (including pickerel, jacks, and yellow jack).....	206, 572	201, 290	198, 748	248, 842	245, 257	182, 647
Sablefish (black cod).....	502, 331	631, 293	805, 521	1, 095, 704	1, 068, 344	906, 076
Salmon, chinook or king.....	1, 384, 760	1, 947, 210	2, 310, 507	2, 324, 761	2, 139, 758	1, 959, 040
Salmon, silver or coho.....	363, 747	2, 019, 831	3, 474, 599	4, 485, 205	4, 872, 948	4, 296, 239
Salmon, fall and pink.....	409, 020	529, 556	594, 302	820, 388	1, 307, 858	1, 106, 301
Salmon, steelhead trout.....	623, 103	689, 280	697, 699	606, 736	576, 183	513, 890
Salmon, red or sockeye <sup>1</sup> .....	397, 323	460, 100	524, 953	661, 904	571, 887	551, 101

<sup>1</sup> Prior to July 15, 1932, this item was listed as "Salmon, all other" and may have included species properly classified in one of the other groups of salmon.

*Holdings of frozen fishery products, 1932—Continued*

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	July	August	Septem-ber	October	Novem-ber	Decem-ber
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Scup (porgies).....	300,748	334,167	353,555	343,939	322,693	262,527
Shad and shad roe.....	236,668	187,910	270,410	253,358	249,578	230,661
Shellfish.....	1,438,877	1,354,759	1,248,837	1,582,603	1,785,985	1,899,675
Smelts, eulachon, etc.....	197,392	186,915	191,507	180,362	240,171	258,631
Squid.....	2,559,458	2,604,517	2,423,032	2,222,493	2,097,601	1,850,703
Sturgeon and spoonbill cat.....	606,572	556,352	520,944	767,336	730,161	846,451
Suckers.....	14,160	11,378	12,207	16,103	19,995	14,136
Weakfish (including southern "sea trout").....	384,826	624,120	689,489	684,680	665,852	878,290
Whitefish.....	660,006	1,181,026	1,733,576	1,761,807	1,736,548	1,606,440
Whiting.....	5,246,188	5,364,879	5,106,113	4,732,202	4,516,083	3,681,339
Miscellaneous fish.....	4,837,376	5,650,462	5,859,569	5,744,308	6,103,730	6,116,659
Total.....	41,305,685	51,581,355	59,269,168	63,073,022	62,103,792	55,738,170

BY GEOGRAPHICAL SECTIONS AND MONTHS <sup>2</sup>

(Expressed in thousands of pounds; that is, 000 omitted)

Month ended the 15th of—	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific <sup>3</sup>	Total
January.....	18,958	16,269	3,738	7,998	3,695	886	12,934	64,478
February.....	14,867	14,017	3,140	6,090	3,297	860	8,330	50,601
March.....	9,011	10,527	1,919	4,075	2,893	700	6,439	35,564
April.....	5,664	7,351	994	3,302	2,461	576	5,568	25,916
May.....	7,068	7,011	1,043	3,735	2,230	587	6,948	28,622
June.....	10,736	7,802	1,253	3,864	2,057	681	7,918	34,311
July.....	15,302	8,578	1,391	3,762	1,904	647	9,722	41,306
August.....	19,641	10,078	2,086	3,717	1,850	581	13,628	51,581
September.....	23,895	10,118	2,505	3,787	1,715	581	16,668	59,269
October.....	25,879	10,628	2,435	3,731	2,056	561	17,783	63,073
November.....	24,167	10,813	2,623	4,904	2,333	592	16,672	62,104
December.....	20,311	11,046	3,128	5,372	2,401	594	12,886	55,738
Average.....	16,292	10,353	2,188	4,528	2,408	654	11,291	47,714

<sup>2</sup> New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; Pacific—Washington, Oregon, California, and Alaska.

<sup>3</sup> Includes a very small amount of fish held in Colorado in the Mountain section.

## COLD-STORAGE HOLDINGS OF CURED FISH

During 1932, monthly holdings of cured herring and mild-cured salmon averaged 18,183,297 pounds, which is an increase of less than one-half of 1 percent as compared with the average monthly holdings in 1931. The holdings in September were the largest, amounting to 21,097,753 pounds, and the smallest were in July, amounting to 14,255,170 pounds.

*Holdings of cured fish, 1932, by species and months*

Month ended the 15th of—	Cured herring	Mild-cured salmon	Total	Month ended the 15th of—	Cured herring	Mild-cured salmon	Total
<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
January.....	15,849,856	4,756,698	20,606,554	July.....	10,349,785	3,905,385	14,255,170
February.....	15,549,801	4,503,513	20,053,314	August.....	12,087,969	6,133,617	18,221,586
March.....	13,740,380	3,020,795	16,761,173	September.....	14,351,194	6,746,559	21,097,753
April.....	13,157,354	2,946,074	16,103,428	October.....	14,250,227	6,779,642	21,029,869
May.....	13,303,682	2,337,839	15,641,521	November.....	14,810,078	6,276,379	21,086,457
June.....	12,774,287	2,672,757	15,447,044	December.....	12,986,672	4,909,028	17,895,700

## FOREIGN FISHERY TRADE

Foreign trade in fishery products in the United States in 1932, amounted to \$37,373,744, of which \$29,565,731 represents the value of these products imported for consumption, and \$7,808,013 the value of exports of domestic fishery products. Compared with the previous year, there was a decrease of 32 percent in the total trade, 31 percent in the value of imports, and 33 percent in the value of exports.

Imports consisted of 259,884,587 pounds of edible products, valued at \$21,672,985, and nonedible products, valued at \$7,892,746. Fishery exports consisted of 86,932,806 pounds of edible products, valued at \$7,657,324, and nonedible products, valued at \$150,689.

*Exports of domestic fishery products, 1932*

Item	Quantity	Value
<b>EDIBLE FISHERY PRODUCTS</b>		
Fish, fresh, frozen, or packed in ice:		
Salmon.....pounds..	5,299,020	\$484,320
Other fresh fish.....do....	3,627,624	201,811
Total.....do.....	8,926,644	686,131
Fish, salted or dry cured:		
Cod.....do....	890,076	93,713
Haddock, hake, and pollock.....do....	562,136	32,801
Herring.....do....	665,268	33,922
Salmon.....do....	1,470,357	157,462
Other.....do....	638,379	35,846
Total.....do.....	4,226,216	353,744
Fish, pickled:		
Salmon.....do....	1,933,200	281,166
Other.....do....	1,284,800	57,285
Total.....do.....	3,218,000	338,451
Fish, canned:		
Salmon.....do....	32,610,017	3,584,886
Sardines.....do....	26,644,525	1,542,399
Mackerel.....do....	1,409,168	79,391
Other.....do....	469,478	67,387
Total.....do.....	61,133,188	5,274,063
Shellfish:		
Canned.....do....	2,234,485	320,734
Not canned.....do....	6,972,007	632,441
Total.....do.....	9,206,492	953,175
Other fish products.....do....	222,266	51,760
Total edible products.....do....	86,932,806	7,657,324
<b>NONEDIBLE FISHERY PRODUCTS</b>		
Marine-animal oils.....do....	1,477,340	64,678
Buttons, pearl or shell.....gross.....	140,953	19,219
Sponges.....pounds..	61,629	66,792
Total.....do.....		86,011
Total nonedible products.....do....		150,689
Grand total.....do.....		7,808,013

*Imports of fishery products entered for consumption, 1932*

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh or frozen:		
Whole, beheaded, or eviscerated or both:		
Salmon.....	2,931,705	\$248,790
Fresh-water fish, not elsewhere specified:		
Yellow pike.....	6,156,120	530,958
Whitefish.....	6,627,512	633,542
Tullibees.....	1,514,767	70,133
Jacks or grass pike.....	1,781,190	71,977
Lake trout.....	1,586,622	153,642
Yellow perch.....	1,117,278	58,689
Lake herring, ciscoes, and chubs.....	1,315,958	153,469
Fresh water fish, not specially provided for.....	15,302,968	873,357
Eels.....	326,307	23,966
Cod, haddock, hake, pollock, and cusk.....	468,670	19,050
Halibut:		
Fresh.....	1,307,306	108,048
Frozen.....	141,267	10,023
Mackerel.....	583,439	24,827
Swordfish.....	1,552,512	97,758
Sturgeon.....	2,153,879	306,254
Fish, not specially provided for.....	2,259,991	122,669
Whether or not whole:		
Smelts.....	7,407,283	816,193
Tuna fish.....	5,037,875	297,790
Sea herring:		
Fresh.....	10,864,454	30,259
Frozen.....	1,379,422	42,480
Fillets, skinned, boned, sliced, or divided, not specially provided for.....	1,781,698	194,765
Total.....	73,598,223	4,888,639
Fish, salted, dried, smoked, pickled, or preserved:		
Dried and unsalted:		
Cod, haddock, hake, pollock, and cusk.....	368,990	29,104
Other.....	3,302,208	244,515
In oil or in oil and other substances:		
Sardines.....	42,335,906	3,562,489
Anchovies.....	1,853,137	446,160
Antipasto.....	326,957	107,364
Tuna fish.....	5,999,155	717,146
Other.....	260,958	33,967
Not in oil or in oil and other substances:		
In air-tight containers weighing with contents, not over 15 pounds each:		
Anchovies.....	3,036,565	228,020
Salmon.....	5,307,251	230,044
Herring and sardines.....	7,117,096	405,255
Fish cakes, balls, and pudding.....	1,372,277	62,291
Other.....	1,488,560	125,576
Pickled or salted:		
Not in oil, etc., and not in air-tight containers weighing, with contents, 15 pounds or less each:		
Salmon.....	247,374	16,214
Cod, haddock, hake, pollock, and cusk, neither skinned nor boned (except that vertebral column may be removed):		
Containing not more than 43 percent moisture by weight.....	18,405,482	829,753
Containing more than 43 percent moisture by weight.....	16,756,071	622,271
Cod, haddock, hake, pollock, and cusk, skinned or boned.....	1,968,650	149,944
Herring:		
In bulk or in containers weighing, with contents, more than 15 pounds each.....	32,011,053	1,498,514
In containers (not air-tight), weighing, with contents, not more than 15 pounds each (net weight).....	201,423	8,857
Mackerel:		
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight).....	4,205,949	141,470
Pickled or salted, not specially provided for:		
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight).....	1,490,668	105,391
In containers (not air-tight) weighing, with contents, not more than 15 pounds each (net weight).....	34,848	3,020
Smoked or kippered:		
Not in oil, etc., and not in air-tight containers weighing, with contents, 15 pounds or less each:		
Salmon.....	3,328	805
Herring:		
Whole or beheaded.....	822,874	39,948
Eviscerated, split, skinned, boned, or divided.....	904,146	67,448
Cod, haddock, hake, pollock, and cusk:		
Whole, or beheaded, or eviscerated or both.....	676,957	52,787
Filleted, skinned, boned, sliced, or divided.....	915,242	80,513
Smoked or kippered, not specially provided for.....	13,155	1,565

*Imports of fishery products entered for consumption, 1932—Continued*

Item	Pounds	Value
<b>EDIBLE FISHERY PRODUCTS—continued</b>		
Fish, salted, dried, smoked, pickled, or preserved—Continued.		
Prepared or preserved, not specially provided for:		
In containers weighing, with contents, not more than 15 pounds each.	93,501	\$14,238
In bulk, or in containers weighing, with contents, more than 15 pounds each (net weight)	305,601	29,129
Fish paste and fish sauce	61,742	15,949
Total	151,887,124	9,869,747
Caviar and other fish roe:		
Not boiled, etc.:		
Sturgeon	372,042	448,693
Fish roe, not specially provided for	99,261	14,392
Boiled, packed in air-tight containers	57,781	4,423
Total	529,084	467,508
Shellfish:		
Crab meat, crab sauce, and crab paste	8,869,673	3,111,109
Clams, clam juice, or either in combination with other substances, in air-tight containers	1,483,942	153,792
Oysters, oyster juice, or either in combination with other substances, in air-tight containers	166,320	25,339
Lobsters, (including spiny lobsters and crawfish):		
Not canned	11,694,342	1,941,240
Canned	1,307,078	567,708
Clams not in air-tight containers	2,373,086	30,139
Shrimps and prawns	457,291	57,828
Scallops	367,430	42,040
Oysters, not in air-tight containers	3,521,287	195,897
Shellfish, not specially provided for	3,198,489	294,343
Pastes and sauces of shellfish, not specially provided for	115,340	10,519
Crabs	19,059	1,315
Turtles	296,819	15,822
Total	33,870,156	6,447,091
Total, edible fishery products	259,884,587	21,672,985
<b>NONEDIBLE FISHERY PRODUCTS</b>		
Marine-animal oils:	Quantity	
Cod oil	gallons	3,296,366
Cod-liver oil	do	1,247,998
Eulachon oil	do	850
Herring oil	do	2,094,417
Menhaden and sod oil	do	58,633
Seal oil	do	60,383
Whale oil:		
Sperm, crude	do	184,645
Sperm, refined or otherwise processed	do	56,676
Whale oil, not specially provided for	do	5,618,192
Total	12,618,160	4,566,567
Pearls and imitation pearls:		
Pearls and parts, not strung or set		552,908
Imitation pearls:		
Half pearls and hollow or filled		9,426
Solid pearls, not elsewhere specified:		
Valued at more than one-fourth cent and not more than 1 cent an inch	121,909	840
Valued at more than 5 cents an inch	5,178	524
Iridescent solid pearls:		
Valued at not more than 10 cents per inch	71,910	278
Valued at more than 10 cents per inch	1,932	250
Total		564,226
Shells and buttons of pearl or shell:		
Shells, unmanufactured—		
Green snail shell	pounds	109,456
Mother-of-pearl	do	3,974,903
Shells, not specially provided for	do	4,794,724
Shells and mother-of-pearl, engraved, cut, ornamented, or manufactured		26,363
Shell pearl buttons—Ocean	gross	930,034
Total		1,291,699

*Imports of fishery products entered for consumption, 1932—Continued*

Item	Pounds	Value
NONEDIBLE FISHERY PRODUCTS—continued		
Sponges:		
Sheepswool.....pounds	119, 430	\$226, 489
Yellow, grass, or velvet.....do	224, 246	98, 148
Other.....do	26, 852	47, 846
Manufactures of.....do	441	150
Total.....	370, 969	372, 633
Agar-agar.....pounds	468, 999	194, 963
Ambergris.....do	13	2, 402
Cod-liver oil cake and cod-liver oil cake meal.....do	1, 147, 285	20, 834
Cuttlefish bone.....do	341, 296	31, 897
Goldfish, live.....number	1, 575, 615	12, 195
Fish for other than human consumption.....		115, 754
Fish sounds.....pounds	95, 947	11, 861
Fish scrap and fish meal.....long tons	21, 805	530, 502
Skins, fish, raw, or salted.....pounds	1, 117, 648	47, 797
Skins, seal, raw (not fur skins).....do	1, 703, 549	119, 830
Spermaceti wax.....do	80, 952	7, 093
Whalebone, unmanufactured.....do	767	991
Whalebone, manufactures of.....		1, 502
Total.....		1, 097, 621
Total nonedible fishery products.....		7, 892, 746
Grand total.....		29, 565, 731

## FISHERIES OF THE NEW ENGLAND STATES

(Area XXII) <sup>3</sup>

The yield of the commercial fisheries of the New England States (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) during 1932, amounted to 480,520,881 pounds, valued at \$14,-001,296 to the fishermen, representing a decrease of 10 percent in volume and 28 percent in value as compared with the catch in the previous year. In addition there was a production of 229,192 bushels of seed oysters, valued at \$119,785. These fisheries gave employment to 16,580 fishermen, including those in the fishery for seed oysters.

*Fisheries of the New England States, 1932*

## SUMMARY OF CATCH

Product	Maine		New Hampshire		Massachusetts	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	75, 595, 283	\$941, 332	523, 891	\$13, 249	335, 222, 512	\$7, 384, 574
Shellfish, etc.....	15, 006, 585	1, 471, 948	219, 803	44, 479	12, 370, 857	1, 543, 696
Total.....	90, 601, 868	2, 413, 280	743, 694	57, 728	347, 593, 369	8, 928, 270

  

Product	Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	12, 657, 715	\$354, 958	16, 918, 844	\$489, 895	440, 918, 245	\$9, 184, 008
Shellfish, etc.....	7, 878, 466	1, 136, 442	4, 126, 915	620, 723	39, 602, 636	4, 817, 288
Total.....	20, 536, 191	1, 491, 400	21, 045, 759	1, 110, 618	480, 520, 881	14, 001, 296

<sup>3</sup> This is the number given this area by the North American Council on Fishery Investigations. It should be explained that there are included under this area craft owned in the area but at times fishing elsewhere. Notable examples are the ground fish fishery in area XXI and the mackerel and southern trawl fisheries in areas XXIII and XXIV. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

*Fisheries of the New England States, 1932—Continued*

## OPERATING UNITS: BY STATES

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	433		4,081	228	400	5,142
On boats and shore:						
Regular.....	3,617	62	2,612	738	258	7,287
Casual.....	1,379	23	1,805	254	582	4,043
Total.....	5,429	85	8,498	1,220	1,240	16,472
Vessels:						
Steam.....	1		14		9	24
Net tonnage.....	18		2,106		1,864	3,988
Motor.....	79		366	80	69	594
Net tonnage.....	904		14,164	951	965	16,984
Sail.....	1		1			2
Net tonnage.....	47		6			53
Total vessels.....	81		381	80	78	620
Total net tonnage.....	969		16,276	951	2,829	21,025
Boats:						
Motor.....	2,225	50	1,643	448	238	4,604
Other.....	1,364	10	1,623	483	311	3,791
Accessory boats.....	160		962	48	42	1,212
Apparatus:						
Purse seines:						
Mackerel.....	10		110	1	4	125
Length, yards.....	3,284		53,720	240	730	57,974
Other.....	49		2	3		54
Length, yards.....	8,300		260	330		8,890
Haul seines.....	29	1	18	8	28	84
Length, yards.....	3,120	45	2,960	845	3,482	10,452
Gill nets:						
Anchor.....	1,611	2	1,038		2	2,653
Square yards.....	382,605	360	395,430		2,040	780,435
Drift.....	100		8,120	130	50	8,400
Square yards.....	33,540		2,761,984	52,180	15,250	2,862,954
Runaround.....			1	6		7
Square yards.....			1,800	2,700		4,500
Stake.....					21	21
Square yards.....					2,760	2,760
Lines:						
Hand.....	3,443	90	568	348	332	4,781
Hooks.....	3,949	92	858	508	350	5,757
Trawl.....	24,600	360	54,271	1,116	841	81,188
Hooks.....	1,231,000	18,000	2,414,226	52,040	37,800	3,753,066
Pound nets.....	4		122	51	14	191
Floating traps.....	19		19	56		94
Weirs.....	226		6			232
Fyke nets.....	48		28	170	103	349
Dip nets.....	134		109	14	23	280
Bag nets.....	106					106
Push nets.....			111			111
Pocket nets.....	2					2
Otter trawls.....	33		306	76	108	523
Yards at mouth.....	857		9,013	2,079	3,331	15,280
Box traps.....	2		3			5
Pots:						
Crab.....	1,793		1,546		12	3,351
Eel.....	490		1,590	1,717	1,339	5,136
Lobster.....	205,217	4,120	73,440	42,085	16,733	341,595
Periwinkle or cockle.....			975	1,630		2,605
Harpoons.....	55	2	129	67	28	281
Spears.....	23		262	43	56	384
Dredges:						
Clam.....			67	12		79
Yards at mouth.....			36	8		44
Oyster.....			30	36	48	114
Yards at mouth.....			35	54	76	165
Scallop.....	105		3,218	624	2	3,949
Yards at mouth.....	167		2,231	521	7	2,926
Tongs.....			171	403	166	740
Rakes.....			657	45	104	806
Forks.....			925	26		951
Hoes.....	1,596		251	2	95	1,944



*Fisheries of the New England States, 1932—Continued*

CATCH: BY STATES

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>												
Alewives	2,206,287	\$9,145	19,800	\$200	1,104,283	\$8,412	72,470	\$761	19,339	\$221	3,572,179	\$18,739
Amberjack	1,414	55			226,003	975	134,275	11,173	285,983	24,559	647,885	51,996
Bluefish	146,568	4,235			33,728	1,633	10,747	468	17,506	1,243	44,522	2,104
Bonito					1,452,184	8,454	646,039	25,980	41,430	3,452	2,202,297	99,912
Butterfish									1,600	32	1,600	3,452
Carp												
Catfish and bullheads												
Cod	12,105,284	231,660	54,848	1,453	71,479,827	1,421,807	722,107	24,433	1,913,545	45,904	86,275,611	1,725,257
Croaker					408,884	10,427					408,884	10,427
Cunners												
Cusk	1,029,147	13,081	394	8	4,035,540	51,432	76,000	2,170	107,702	2,303	5,172,783	66,824
Drum, black												
Eels	131,455	11,515			438,205	16,880	195,749	12,499	196,013	15,888	961,422	56,782
Flounders	866,669	21,905	126	5	23,313,097	802,265	4,761,587	117,229	8,547,525	187,578	37,489,004	1,128,982
Goosefish									2,332	23	2,332	23
Grayfish												
Haddock	9,798,746	296,018	205,046	7,242	24,149	345	2,900	29	3,820,864	112,366	150,468,362	3,400,076
Hake	6,171,696	55,619	202,045	3,109	10,366,864	3,006,089	257,133	7,761	181,135	3,150	16,941,640	208,022
Halibut	70,220	9,035			2,316,420	146,495	19,990	249	30,005	3,657	2,416,645	236,703
Herring, sea	31,988,132	99,083			5,687,254	50,277	399,066	7,302			38,074,422	156,662
Herring smelt												
Hogfish					3,600	169					3,600	169
King whiting or "kingfish"	465	17			2,998	37					2,998	37
Launce					5,991	182	488	29			6,943	228
Mackerel	7,661,060	96,713	2,600	104	24,000	480					24,000	480
Menhaden					51,527,593	850,043	777,361	12,873	119,553	2,627	60,088,143	962,360
Minnows					46,892	467	1,512	38	5,320	203	53,634	708
Mummichog					125	25			186	5,325	211	
Pollock	1,997,478	12,220	29,686	451	8,285,290	85,913	42,946	474	4,250	43	10,635,069	103,237
Rosfish	1,995	20			117,575	1,396			279,609	4,179	124,729	1,550
Salmon	10,100	8,566							5,159	134	36,125	8,566
Scup or porpy									63,207	2,530	4,437,742	113,908
Sea bass					2,426,516	61,983	1,957,919	49,333	124,834	7,985	3,606,970	94,597
Sea robin					3,419,394	84,026	62,742	2,586	30,378	241	3,482,442	1,246
Shad	107,891	1,699			5,050	51	81,002	954	116,430	1,246	116,430	1,246
Sharks	60,570	502			46,198	2,125	7,502	471	70,525	8,463	232,116	12,758
Skates					44,631	331	700	7	139,118	1,185	245,019	7,425
Smelt					32,067	316	917,089	7,137			949,156	7,425
Spot	270,327	36,546	1,850	353	1,800	252	240	36	3,124	312	277,341	37,499
Squeelages or "sea trout"					22,200	222					22,200	222
Gray												
Spotted	318	17			57,373	2,432	58,137	5,103	16,505	1,828	132,333	9,380
					2,328	216					2,328	216

## Fisheries of the New England States, 1932—Continued

CATCH: BY STATES—Continued

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH—continued												
Striped bass	537	\$88			30,926	\$5,389	389,110	42,259	381,461	38,390	41,938	\$6,916
Sturgeon	2,122	267			5,810	451	210,008	8,314	76,709	445,834	8,132	738
Suckers	43,500	1,740							249,207	10,576	138,086	5,931
Swellfish	200	2									200	2
Swordfish	579,611	56,656			3,188,168	348,085						
Tautog					159,117	6,132						
Tilfish							3,460	52	2,250	56,224		
Tomcod	50,514	892		\$261	149,154	6,977	21,833	1,092	2,858	253,445		1,169
Tuna or "horse mackerel"	78,517	2,968	3,264		46,920	5,022	6,000	420	5,625	53,626		11,561
White perch	2,486	25			6,376,948	49,389	792,215	11,563	29,399	248	7,201,048	61,225
Whiting	85,836	970	4,232	63	1,796,840	26,720			46,042	906	1,932,950	28,659
Wolfish					3,085	367	12,467	1,247	125	40	15,689	1,655
Yellow perch	12	1										
Total	75,595,283	941,332	523,891	13,249	335,222,512	7,384,574	12,657,715	354,958	16,918,844	489,895	440,918,245	9,184,008
SHELLFISH, ETC.												
Crabs:												
Hard	831,026	21,650			199,450	26,615	39,120	5,827	27,251	868	1,096,847	54,960
Soft									1,095	425	1,095	425
Lobsters	6,056,932	1,090,741	219,803	44,479	2,146,371	433,404	1,257,204	203,255	589,809	141,148	10,279,119	1,913,027
Strimp												
Squid	4,529	57			2,147,582	22,937	946,051	17,970	12,005	554	3,110,167	41,518
Clams:												
Coche					50,022	5,767	187,626	10,022			237,648	15,789
Hard, public <sup>1</sup>	134,860	13,642			1,797,353	195,982	1,312,400	162,587			3,450,493	420,442
Hard, private <sup>1</sup>					8,260	1,750			205,880	48,231	8,260	1,750
Razor					403,744	17,254					403,744	17,254
Soft, public <sup>1</sup>	7,263,025	234,297			2,802,909	226,656	13,740	1,970	64,262	9,041	10,144,536	471,964
Surf or skimmer					35,390	3,325					35,390	3,325
Mussels, sea	33,690	1,404			29,700	3,000					63,390	4,404
Oysters:												
Market, public, spring					5,250	1,600			24,179	3,358	29,429	4,955
Market, public, fall					1,312	1,300	1,300	250	11,475	1,200	14,087	1,750
Market, private, spring					118,824	43,817	951,375	176,381	1,155,078	153,086	2,225,277	373,284
Market, private, fall					154,184	49,791	3,037,801	518,744	1,925,654	253,800	5,117,635	822,535
Periwinkles	53,109	2,186			17,550	1,225			6,700	84	77,359	3,495
Scallops:												
Bay					1,405,498	362,088	131,859	39,436			1,537,357	401,504
Sea	607,780	96,239			809,634	88,555			94,527	8,928	1,571,941	193,722
Irish moss					83,500	4,175			83,500		83,500	4,175

Bloodworms.....	21, 034	11, 732	37, 633	34, 110	58, 667	45, 812
Sandworms.....			34, 956	21, 030	34, 956	21, 030
Turtles, loggerhead.....			1, 425	15	1, 425	15
Total.....	15, 006, 585	1, 471, 948	12, 370, 857	1, 543, 696	39, 602, 636	4, 817, 288
Grand total.....	90, 601, 868	2, 413, 280	347, 593, 369	8, 928, 270	480, 520, 881	14, 001, 296

<sup>1</sup> Statistics on hard clams used in this table are based on yields of 11 pounds of meats per bushel in Maine, Massachusetts, and Rhode Island and 10 pounds in Connecticut.

<sup>2</sup> Statistics on soft clams used in this table are based on yields of 15 pounds of meats per bushel in Maine; 16.09 pounds in Massachusetts; 15.61 pounds in Rhode Island; and 14 pounds in Connecticut.

<sup>3</sup> Statistics on oysters used in this table are based on yields of 6.56 pounds of meats per bushel in Massachusetts; 6.50 pounds in Rhode Island; and 6.75 pounds in Connecticut.

NOTE.—Of the total catch in Maine 27,100 pounds of fishery products, valued at \$1,218, were taken in the southern winter trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in Massachusetts, 7,385,576 pounds of fishery products, valued at \$204,542, were taken in the same fishery, while of the total catch in Connecticut, 191,494 pounds of fishery products, valued at \$9,381, were taken in the same fishery. These products consisted principally of scup or porgy, sea bass, flounders, croaker, and gray squeteague.

*Fisheries of the New England States, 1932—Continued*

## PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maine		Massachu- setts		Rhode Island		Connecticut		Total	
	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value
Crabs:										
Hard.....number..	2, 493, 078	\$21, 650	598, 350	\$26, 615	117, 360	\$5, 827	81, 753	\$868	3, 290, 541	\$54, 960
Soft.....do.....							4, 380	425	4, 380	425
Clams:										
Cockle.....bushels..			2, 779	5, 767	10, 424	10, 022			13, 203	15, 789
Hard, public.....do..	12, 260	13, 642	163, 395	195, 982	119, 309	162, 587	20, 588	48, 231	315, 552	420, 442
Hard, private.....do..			750	1, 750					750	1, 750
Razor.....do.....			12, 617	17, 254					12, 617	17, 254
Soft, public.....do..	484, 242	234, 297	174, 202	226, 656	880	1, 970	4, 590	9, 041	663, 914	471, 964
Surf or skimmer.....do..			3, 077	3, 525					3, 077	3, 525
Mussels, sea.....do..	3, 369	1, 404	2, 970	3, 000					6, 339	4, 404
Oysters:										
Market, public, spring bushels.....			800	1, 600			3, 582	3, 358	4, 382	4, 958
Market, public, fall bushels.....			200	300	200	250	1, 700	1, 200	2, 100	1, 750
Market, private, spring bushels.....			18, 114	43, 817	146, 365	176, 381	171, 123	153, 086	335, 602	373, 284
Market, private, fall bushels.....			23, 504	49, 791	467, 354	518, 744	285, 282	253, 800	776, 140	822, 335
Periwinkles.....do....	2, 665	2, 186	975	1, 225			335	84	3, 965	3, 495
Scallops:										
Bay.....do.....			208, 222	362, 068	19, 535	39, 436			227, 757	401, 504
Sea.....do.....	90, 041	96, 239	128, 835	88, 555			14, 004	8, 928	232, 880	193, 722

## SEED OYSTER FISHERY

Item	Rhode Island	Connecticut	Total			
OPERATING UNITS						
Fishermen:	Number	Number	Number			
On vessels.....		79	79			
On boats and shore:						
Regular.....	10	6	16			
Casual.....		172	172			
Total.....	10	257	267			
Vessels:						
Steam.....		4	4			
Net tonnage.....		344	344			
Motor.....		13	13			
Net tonnage.....		140	140			
Sail.....		3	3			
Net tonnage.....		23	23			
Total vessels.....		20	20			
Total net tonnage.....		507	507			
Boats:						
Motor.....		6	6			
Other.....		112	112			
Apparatus:						
Dredges, oyster.....		97	97			
Yards at mouth.....		88	88			
Tongs.....		129	129			
Rakes.....	10	41	51			
CATCH						
Oysters:	Bushels	Value	Bushels	Value	Bushels	Value
Seed, public, spring.....			29, 164	\$15, 840	29, 164	\$15, 840
Seed, public, fall.....	1, 022	\$307	42, 450	19, 593	43, 472	19, 900
Seed, private, spring.....			136, 356	74, 445	136, 356	74, 445
Seed, private, fall.....			20, 200	9, 600	20, 200	9, 600
Total.....	1, 022	307	228, 170	119, 478	229, 192	119, 785

NOTE.—Of the number of persons fishing for seed oysters, 10 in Rhode Island, and 149 in Connecticut—a total of 159 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 100 boats other than motor in Connecticut, 112 tongs, and all the rakes.

## MAINE

## Fisheries of Maine, 1932

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines		Pound nets
	Mack- arel	Other		Anchor	Drift	Hand	Trawl	
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels	41	161		62	14	13	162	
On boats and shore:								
Regular	13	82	39	139		325	531	5
Casual				87	4	536	24	
Total	54	183	39	276	18	874	715	5
Vessels:								
Steam	1							
Net tonnage	15							
Motor	6	21		12	2	5	29	
Net tonnage	63	192		114	36	49	325	
Sail		1						
Net tonnage		47						
Total vessels	7	22		12	2	5	56	
Total net tonnage	81	239		114	36	49	325	
Boats:								
Motor	3	24	29	67	3	269	415	4
Other	3	28	23	53	1	5	11	
Accessory boats	6	17		3			119	
Apparatus:								
Number	19	49	29	1,511	109	3,452	24,600	4
Length, yards	2,284	8,360	3,150					
Square yards				382,805	33,540			
Hooks, baits or snoods						3,649	1,231,000	
Item	Floating traps	Weirs	Fyke nets	Dip nets	Bag nets	Pocket nets	Otter trawls	Box traps
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels							41	
On boats and shore:								
Regular	23	124		7			44	
Casual	3	141	9	127	65	1		2
Total	26	265	9	134	65	1	85	2
Vessels:								
Motor							15	
Net tonnage							112	
Boats:								
Motor	12	71					20	
Other	5	164	9	4	15			
Apparatus:								
Number	19	229	48	134	106	2	33	2
Yards at mouth							587	

*Fisheries of Maine, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Pots			Har- poons	Spears	Dredges, scallop	Hoes	By hand	Total, exclu- sive of dupli- cation
	Crab	Eel	Lobster						
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			5	103		33			433
On boats and shore:									
Regular.....	44	5	2, 572	77		105	1, 113	18	3, 617
Casual.....	11	19	47		23	17	507	36	1, 379
Total.....	55	24	2, 624	180	23	155	1, 620	54	5, 429
Vessels:									
Steam.....									1
Net tonnage.....									18
Motor.....			5	15		8			79
Net tonnage.....			28	312		95			904
Sail.....									1
Net tonnage.....									47
Total vessels.....			5	15		8			81
Total net ton- nage.....			28	312		95			969
Boats:									
Motor.....	25	1	1, 839	40		78	173		2, 225
Other.....	27	23	665		23		677		1, 364
Accessory boats.....				15					160
Apparatus:									
Number.....	1, 793	490	205, 217	55	23	105	1, 596		
Yards at mouth.....						167			

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets			
	Mackerel		Other				Anchor		Drift	
	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>
Alewives	508, 527	\$2, 553	13, 750	\$69			78, 640	\$641	785	\$8
Bluefish	1, 159	35								
Butterfish	7, 112	280	15, 444	459					47	3
Cod	145	3					4, 815, 374	106, 059		
Cusk							18, 156	183		
Flounders							15, 179	229		
Haddock							1, 540, 703	31, 931		
Hake							447, 538	4, 275		
Halibut							69	10		
Herring, sea	949, 712	4, 661	14, 901, 561	46, 711			76, 893	274		
Mackerel	4, 223, 594	52, 507	477, 492	6, 612			764, 829	12, 155	120, 700	5, 377
Pollock	16, 994	87	50, 982	260			852, 187	4, 690		
Salmon							3, 638	732		
Shad	72, 721	772	14, 590	290			2, 306	182	13	1
Sharks	2, 470	20					49, 549	403	2, 304	17
Smelt					45, 011	\$4, 920	30, 264	4, 676		
Sturgeon	513	40					809	91	800	136
Tomcod					3, 714	38				
Wolfish							3, 283	14		
Lobsters							162	41		
Total	5, 782, 947	60, 958	15, 473, 819	54, 401	48, 725	4, 958	8, 699, 579	166, 586	124, 649	5, 542

## Fisheries of Maine, 1932—Continued

## CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Floating traps		Weirs	
	Hand		Trawl							
	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value
Alewives.....									557,975	\$2,068
Bluefish.....							255	\$20		
Butterfish.....					21,019	\$620	102,472	2,858		
Cod.....	2,234,500	\$29,920	4,459,169	\$86,631						
Cusk.....	12,257	70	940,787	12,034						
Eels.....			10,240	819						
Flounders.....	415	8	10,591	190					8,150	488
Haddock.....	1,212,852	26,829	5,824,061	172,815						
Hake.....	1,489,216	9,560	3,930,737	39,101						
Halibut.....	8,864	1,030	57,623	7,478						
Herring, sea.....					50,253	629	149,544	1,870	15,860,169	44,938
Mackerel.....					155,392	1,741	916,568	9,667	1,002,485	8,654
Pollock.....	690,149	4,596	330,159	2,294			56,640	290		
Rosefish.....			633	6						
Salmon.....					268	54	6,101	1,337	25,518	6,323
Shad.....					3,828	124	1,679	54	12,754	276
Sharks.....	6,000	60								
Smelt.....	108,212	15,479					3,940	411	4,337	680
Striped bass.....									537	68
Whiting.....					2,486	25				
Wolfish.....			79,818	940						
Squid.....					4,474	56				
Total.....	5,762,465	87,552	15,643,818	322,308	237,720	3,249	1,237,199	16,507	17,471,925	63,495

Species	Fyke nets		Dip nets		Bag nets		Pocket nets		Otter trawls	
	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value
Alewives.....			1,136,610	\$3,806						
Butterfish.....									474	\$15
Cod.....									596,096	9,047
Cusk.....									57,947	794
Eels.....	2,516	\$202								
Flounders.....									832,334	20,990
Haddock.....									1,221,130	34,443
Hake.....									304,205	2,683
Halibut.....									3,664	517
King whiting or "kingfish".....									466	17
Pollock.....									367	3
Rosefish.....									1,362	14
Salmon.....			600	120						
Scup or porgy.....									10,100	62
Sharks.....									247	2
Smelt.....			16,280	2,706	61,283	\$7,554	1,000	\$120		
Squeteague or "sea trout", gray.....									318	17
Suckers.....	43,500	1,740								
Swellfish.....									200	2
Tomcod.....	26,800	804			20,000	50				
Wolfish.....									2,735	16
Yellow perch.....	12	1								
Squid.....									55	1
Total.....	72,828	2,747	1,153,490	6,632	81,283	7,604	1,000	120	3,031,700	68,623

Species	Box traps		Pots						Harpoons	
			Crab		Eel		Lobster			
	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value
Eels.....	9,200	\$816			67,014	\$5,369				
Swordfish.....									579,611	\$56,656
Tuna or "horse mackerel".....									78,517	2,998
Crabs, hard.....			614,022	\$15,139			217,004	\$6,511		
Lobsters.....			9,936	2,530			6,046,834	1,088,170		
Total.....	9,200	816	623,958	17,669	67,014	5,369	6,263,838	1,094,681	658,128	59,654

*Fisheries of Maine, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Spears		Dredges, scallop		Hoes		By hand	
	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value
Eels.....	42, 485	\$4, 309						
Clams:								
Hard, public.....					134, 860	\$13, 642		
Soft, public.....					7, 263, 625	234, 297		
Mussels.....							33, 690	\$1, 404
Periwinkles.....							53, 109	2, 186
Scallops, sea.....			607, 780	\$96, 239				
Bloodworms.....					21, 034	11, 732		
Total.....	42, 485	4, 309	607, 780	96, 239	7, 419, 519	259, 671	86, 799	3, 590

## NEW HAMPSHIRE

*Fisheries of New Hampshire, 1932<sup>1</sup>*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, anchor	Lines		Pots, lobster	Harpoons	Total, exclusive of duplication
			Hand	Trawl			
Fishermen:							
On boats and shore.....	Number	Number	Number	Number	Number	Number	Number
Regular.....	2	2		11	57	4	62
Casual.....			23				23
Total.....	2	2	23	11	57	4	85
Boats:							
Motor.....	1	1	1	8	47	2	50
Other.....	1				9		10
Apparatus:							
Number.....	1	2	90	360	4, 120	2	
Length, yards.....	45						
Square yards.....		360					
Hooks.....			92	18, 000			

## CATCH: BY GEAR

Species	Haul seines		Gill nets, anchor		Lines				Pots, lobster		Harpoons	
	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value	Lb.	Value
Alewives.....	19, 800	\$200										
Cod.....					3, 800	\$162	51, 048	\$1, 291				
Cusk.....							394	8				
Flounders.....							126	5				
Haddock.....							205, 046	7, 242				
Hake.....							202, 045	3, 109				
Mackerel.....			2, 600	\$104								
Pollock.....							29, 686	451				
Smelt.....	350	53			1, 500	300						
Tuna or "horse mackerel".....											3, 264	\$261
Wolfish.....							4, 232	63				
Lobsters.....									219, 803	\$44, 479		
Total.....	20, 150	253	2, 600	104	5, 300	462	492, 577	12, 169	219, 803	44, 479	3, 264	261

<sup>1</sup> The fisheries of New Hampshire are confined to Rockingham County.



## MASSACHUSETTS

## Fisheries of Massachusetts, 1932

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets			Lines		Pound nets	Floating traps
	Mackerel	Other		Anchor	Drift	Runaround	Hand	Trawl		
<b>Fishermen:</b>	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	1, 121			169	490	4	163	1, 229		
On boats and shore—										
Regular.....	59		49	8	178		224	579	184	44
Casual.....	11	6	9		8		48	4		
Total.....	1, 191	6	58	177	676	4	435	1, 812	184	44
<b>Vessels:</b>										
Motor.....	97			19	64	1	17	75		
Net tonnage.....	3, 315			362	1, 489	5	420	3, 822		
Sail.....							1			
Net tonnage.....							6			
Total vessels.....	97			19	64	1	18	75		
Total net tonnage.....	3, 315			362	1, 489	5	426	3, 822		
<b>Boats:</b>										
Motor.....	122	2	6	4	86		179	218	49	18
Other.....	12	4	28		70		58	70	85	26
Accessory boats.....	52			17	71	2	13	578		
<b>Apparatus:</b>										
Number.....	110	2	18	1, 038	8, 120	1	568	54, 271	122	19
Length, yards.....	53, 720	260	2, 960							
Square yards.....				395, 430	2, 761, 984	1, 800				
Hooks, baits, or snoods.....							858	2, 414, 226		

  

Item	Weirs	Fyke nets	Dip nets	Push nets	Otter trawls	Box traps	Pots			
							Crab	Eel	Lobster	Periwinkle or cockle
<b>Fishermen:</b>	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....					1, 996				6	
On boats and shore—										
Regular.....	8	13	124	23	149	3	33	41	566	20
Casual.....		8	41	88				9	398	
Total.....	8	21	165	111	2, 145	3	33	50	970	20
<b>Vessels:</b>										
Steam.....					14					
Net tonnage.....					2, 106					
Motor.....					222				3	
Net tonnage.....					8, 891				25	
Total vessels.....					236				3	
Total net tonnage.....					10, 997				25	
<b>Boats:</b>										
Motor.....	2		24		70		23	28	696	11
Other.....	4	10	37	70				24	282	8
Accessory boats.....					96					
<b>Apparatus:</b>										
Number.....	6	28	109	111	306	3	1, 546	1, 590	73, 440	975
Yards at mouth.....					9, 013					

*Fisheries of Massachusetts, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Harpoons	Spears	Dredges			Tongs	Rakes	Forks	Hoes	By hand	Total, exclusive of duplication
			Clam	Oyster	Scallop						
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	701		18	9	89						4,081
On boats and shore—											
Regular.....	88	120	106	24	517	140	406	470	185	24	2,612
Casual.....	7	142			579	31	251	455	66	15	1,805
Total.....	796	262	124	33	1,185	171	657	925	251	39	8,498
Vessels:											
Steam.....											14
Net tonnage.....											2,106
Motor.....	91		8	3	20						366
Net tonnage.....	3,210		86	35	247						14,164
Sail.....											1
Net tonnage.....											6
Total vessels.....	91		8	3	20						381
Total net tonnage.....	3,210		86	35	247						16,276
Boats:											
Motor.....	137		59	12	648	34	49	65			1,643
Other.....	46	145			10	141	577	290	95		1,623
Accessory boats.....	133										962
Apparatus:											
Number.....	129	262	67	30	3,218	171	657	925	251		
Yards at mouth.....			36	35	2,231						

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Mackerel		Other				Anchor	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives	126, 200	\$843			313, 800	\$2, 455	5, 600	\$28
Bluefish					5, 500	550		
Butterfish	5, 950	296					2, 669, 691	78, 659
Cod	72	1					470	3
Cusk								
Eels					100, 000	2, 000		
Flounders							840	14
Haddock							1, 156, 411	24, 857
Hake							800, 567	5, 817
Halibut							74	6
Herring, sea	7, 200	46			3, 500	53		
Launce			24, 000	\$480				
Mackerel	41, 167, 984	669, 181			19, 250	578	7, 750	232
Pollock	440	1					961, 978	6, 988
Shad	1, 340	28			22, 600	1, 130		
Sharks	1, 104	11					2, 132	14
Striped bass					15, 500	2, 325		
Tuna or "horse mackerel"	2, 775	128						
White perch					45, 450	4, 798		
Whiting	75	2						
Yellow perch					3, 000	360		
Total	41, 313, 140	670, 537	24, 000	480	528, 600	14, 249	5, 605, 513	116, 618

*Fisheries of Massachusetts, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Gill nets—Continued				Lines			
	Drift		Runaround		Hand		Trawl	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	400	\$3						
Bluefish.....	21,650	2,363	20,000	\$1,600	139,100	\$8,234		
Bonito.....					200	6		
Butterfish.....	1,455	92			9,500	950	2,631	\$189
Cod.....	441,024	13,710			1,686,707	33,437	28,652,566	552,298
Cusk.....					27,255	369	3,441,296	43,238
Eels.....					10,760	646	63,175	716
Flounders.....	5,500	165			20,600	900	491,033	18,962
Grayfish.....	4,250	85						
Haddock.....	77,869	1,964			199,879	5,068	28,356,066	700,863
Hake.....	119,922	832			28,333	347	5,294,993	72,248
Halibut.....					46,855	4,586	1,764,535	178,489
Herring, sea.....	4,200	52						
Mackerel.....	3,703,091	98,111			75,000	2,250	2,835	76
Pollock.....	63,910	678			123,846	1,313	1,570,756	14,725
Rosefish.....							11,850	232
Scup or porgy.....					264,500	6,321		
Sea bass.....			500	60	75,350	3,152		
Shad.....	35	1						
Sharks.....	330	13						
Skates.....							11,200	112
Smelt.....					1,800	252		
Striped bass.....					3,000	360		
Swordfish.....					162	34	5,455	529
Tautog.....					129,160	5,060		
White perch.....	1,200	216						
Wolfish.....					18,830	452	373,397	5,069
Total.....	4,444,836	118,285	20,500	1,660	2,860,837	73,737	70,041,788	1,587,746

Species	Pound nets		Floating traps		Weirs		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	52,750	\$337	48,200	\$392				
Amberjack.....	975	39						
Bluefish.....	20,514	1,649	935	86	15,000	\$1,500		
Bonito.....	29,883	1,433	200	10	3,175	157		
Butterfish.....	1,041,491	48,819	226,066	8,574	27,785	1,153		
Cod.....	4,518	107	23,727	454	1,732	47		
Eels.....	15,516	777					17,200	\$1,182
Flounders.....	26,634	935						
Grayfish.....	17,834	236			1,200	14		
Hake.....			4,512	57				
Herring, sea.....	2,380,574	17,052	342,705	3,329	24,575	185		
Mackerel.....	4,173,724	51,761	1,389,245	16,807	893,745	7,328		
Menhaden.....	2,156	21	44,646	446				
Pollock.....	87,913	800	68,023	397				
Scup or porgy.....	104,742	3,239						
Sea bass.....	15,599	1,401						
Sea robin.....	5,050	51						
Shad.....	15,638	741	1,275	64				
Sharks.....	25,968	118	270	5				
Skates.....	4,497	46						
Squeteagues or "sea trout":.....								
Gray.....	157	16						
Spotted.....	2,328	216						
Striped bass.....	276	36	50	3	1,600	180		
Swordfish.....	228	27						
Tautog.....	29,162	1,037	480	24	175	7		
Tuna or "horse mackerel".....	124,637	5,893	200	14	9,965	519		
Whiting.....	4,577,772	34,359	1,079,386	6,729	587,850	4,409		
Yellow perch.....	85	7						
Squid.....	1,978,189	20,440	48,025	829	74,995	868		
Turtles, loggerhead.....	1,425	15						
Total.....	14,740,235	191,608	3,277,945	38,220	1,641,797	16,367	17,200	1,182

*Fisheries of Massachusetts, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dip nets		Push nets		Otter trawls		Box traps	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	447, 100	\$3, 320			78, 233	\$574	92, 000	\$460
Bluefish.....					3, 304	227		
Bonito.....					270	27		
Butterfish.....					137, 306	8, 381		
Cod.....					37, 999, 790	743, 094		
Croaker.....					468, 884	10, 427		
Cusk.....					566, 519	7, 822		
Drum, black.....					51	1		
Eels.....					82, 529	2, 938		
Flounders.....					22, 768, 490	781, 289		
Grayfish.....					865	10		
Haddock.....					106, 596, 348	2, 273, 937		
Hake.....					4, 118, 537	67, 194		
Halibut.....					504, 956	60, 930		
Herring, sea.....	2, 870, 000	29, 150			54, 500	410		
Herring smelt.....					3, 600	169		
Hogfish.....					2, 998	37		
King whiting or "kingfish".....					5, 991	182		
Mackerel.....	67, 500	1, 800			27, 445	1, 919		
Minnnows.....	125	25						
Pollock.....					5, 408, 424	61, 011		
Rosefish.....					105, 725	1, 164		
Scup or porgy.....					2, 057, 274	52, 423		
Sea bass.....					3, 327, 945	79, 413		
Shad.....					5, 310	161		
Sharks.....					12, 907	138		
Skates.....					16, 070	146		
Spot.....					22, 200	222		
Squeteagues or "sea trout", gray.....					57, 216	2, 416		
Striped bass.....	10, 500	2, 485						
Sturgeon.....					5, 810	451		
Swordfish.....					1, 212	110		
Tautog.....					140	4		
Tuna or "horse mackerel".....					10, 650	312		
White perch.....					270	8		
Whiting.....					131, 865	3, 890		
Wolfish.....					1, 404, 613	21, 199		
Shrimp.....	320	120						
Scallops, bay.....			66, 528	\$16, 587				
Squid.....					46, 373	800		
Total.....	3, 395, 545	36, 900	66, 528	16, 587	186, 034, 620	4, 183, 436	92, 000	460

Species	Pots							
	Crab		Eel		Lobster		Periwinkle or cockle	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels.....			88, 075	\$4, 980				
Crabs, hard.....	134, 837	\$18, 069			64, 613	\$8, 546		
Lobsters.....					2, 146, 371	433, 404		
Clams, cockle.....							46, 062	\$5, 382
Periwinkles.....							17, 550	1, 225
Total.....	134, 837	18, 069	88, 075	4, 980	2, 210, 984	441, 950	63, 612	6, 607

Species	Harpoons		Spears		Dredges			
	Pounds	Value	Pounds	Value	Clam		Oyster	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels.....			60, 950	\$3, 641				
Sharks.....	1, 920	\$32						
Skates.....	300	12						
Swordfish.....	3, 181, 111	347, 385						
Tuna or "horse mackerel".....	927	111						
Clams:								
Hard, public.....					533, 185	\$55, 219		
Surf or skimmer.....					2, 250	250		
Mussels, sea.....					29, 700	3, 000		
Oysters:								
Market, private, spring.....							69, 285	\$24, 188
Market, private, fall.....							68, 511	19, 446
Total.....	3, 184, 258	347, 540	60, 950	3, 641	565, 135	58, 469	137, 796	43, 634

*Fisheries of Massachusetts, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dredges—Continued		Tongs		Rakes	
	Scallop					
Clams:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Hard, public.....			363,501	\$40,240	900,667	\$100,523
Hard, private.....			8,250	1,750		
Surf or skimmer.....	1,800	\$100				
Oysters:						
Market, public, spring.....			5,250	1,600		
Market, public, fall.....			1,312	300		
Market, private, spring.....			49,539	19,629		
Market, private, fall.....			85,673	30,345		
Scallops:						
Bay.....	1,324,570	341,506			4,500	1,500
Sea.....	869,634	88,555				
Irish moss.....					83,500	4,175
Total.....	2,196,004	430,161	513,525	93,864	988,667	106,198

Species	Forks		Hoes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Cockle.....					3,960	\$385
Razor.....	59,200	\$1,850	344,544	\$15,404		
Soft, public.....	2,590,084	207,426	212,825	19,230		
Surf or skimmer.....	40,800	2,400			10,540	775
Scallops, bay.....					9,900	2,475
Bloodworms.....	37,633	34,110				
Sandworms.....	34,956	21,030				
Total.....	2,762,673	266,816	557,369	34,634	24,400	3,635

## RHODE ISLAND

*Fisheries of Rhode Island, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines		Pound nets	Floating traps
	Mack-erel	Other		Drift	Run-around	Hand	Trawl		
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	3			8		39	10		
On boats and shore:									
Regular.....		15	15	8	12	162	31	43	144
Casual.....			4			7			
Total.....	3	15	19	16	12	208	41	43	144
Vessels:									
Motor.....	1			3		19	4		
Net tonnage.....	7			30		134	26		
Boats:									
Motor.....		3		4	3	105	18	15	24
Other.....		6	10	4	5	20	2	35	56
Accessory boats.....				2		4			
Apparatus:									
Number.....	1	3	8	130	6	348	1,116	51	56
Length, yards.....	240	330	845						
Square yards.....				52,180	2,700				
Hooks, baits, or snoods.....						508	52,040		

*Fisheries of Rhode Island, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Fyke nets	Dip nets	Otter trawls	Pots			Har- poons	Spears
				Eel	Lob- ster	Peri- winkle or cockle		
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			109		32		97	
On boats and shore:								
Regular.....	13	14	58	30	296	27	53	21
Casual.....	1			6	42	1		22
Total.....	14	14	167	36	370	28	150	43
Vessels:								
Motor.....			43		15		33	
Net tonnage.....			383		103		267	
Boats:								
Motor.....	10	12	33	26	253	25	30	
Other.....	2			8	38		30	3
Accessory boats.....			7				35	
Apparatus:								
Number.....	170	14	76	1,717	42,085	1,630	67	43
Yards at mouth.....			2,079					

Item	Dredges			Tongs	Rakes	Forks	Hoes	Total, exclu- sive of dupli- cation
	Clam	Oyster	Scallop					
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Num- ber</i>
On vessels.....	5	69						228
On boats and shore:								
Regular.....	26		152	248	35	10	1	738
Casual.....			22	158	9	16	1	254
Total.....	31	69	174	406	44	26	2	1,220
Vessels:								
Motor.....	2	18						80
Net tonnage.....	18	425						951
Boats:								
Motor.....	10		132	97	8			448
Other.....				310	34		2	483
Accessory boats.....								48
Apparatus:								
Number.....	12	36	624	403	45	26	2	
Yards at mouth.....	8	54	521					

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Mackerel		Other				Drift	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bluefish.....					6,500	\$715	13,750	\$1,180
Eels.....					19,800	1,353		
Herring, sea.....			105,000	\$1,400	20,000	200		
Mackerel.....	45,000	\$675					38,000	710
Squeteagues or "sea trout", gray.....					3,500	350		
Striped bass.....					800	144		
Tautog.....					1,500	75		
Total.....	45,000	675	105,000	1,400	52,100	2,837	51,750	1,890

*Fisheries of Rhode Island, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Gill nets—Con.		Lines				Pound nets	
	Runaround		Hand		Trawl			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....							25,710	\$327
Bluefish.....	24,000	\$2,450	26,500	\$2,695			6,000	500
Butterfish.....							154,383	6,279
Cod.....			461,411	14,978	151,855	\$6,594	1,100	30
Eels.....			12,950	906			41,718	2,571
Flounders.....					1,600	72	29,488	1,612
Grayfish.....							500	5
Haddock.....			6,930	252	129,354	4,669		
Hake.....			4,440	44	1,200	28		
Herring, sea.....							113,506	1,512
Mackerel.....			5,600	168			99,077	2,180
Menhaden.....							100	5
Pollock.....			11,220	130				
Scup or porgy.....							8,500	255
Sea bass.....			200	12				
Sea robin.....							2,000	20
Shad.....							3,655	316
Sharks.....							500	5
Skates.....			2,500	25	3,500	43		
Smelt.....							240	36
Squeteagues or "sea trout", gray.....			500	40			20,612	2,009
Striped bass.....							4,486	569
Tautog.....			103,700	4,138			55,868	2,468
Tomcod.....							3,460	52
Tuna or "horse mackerel".....			19,800	990				
White perch.....							4,500	360
Whiting.....							51,274	634
Yellow perch.....							12,467	1,247
Squid.....							138,476	2,148
Total.....	24,500	2,450	655,751	24,378	287,509	11,406	777,620	25,140

Species	Floating traps		Fyke nets		Dip nets		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	46,760	\$434						
Bluefish.....	57,025	3,633						
Bonito.....	10,747	468						
Butterfish.....	491,656	19,701						
Cod.....	41,946	1,145					65,795	\$1,686
Cunners.....	1,000	20			75,000	\$2,150		
Eels.....	571	28	13,000	\$860			9,000	540
Flounders.....	336,549	10,229	36,600	1,312			4,357,350	104,004
Grayfish.....	2,400	24						
Haddock.....	1,189	32					119,660	2,808
Hake.....	14,260	177						
Herring, sea.....	115,335	1,400					45,225	2,790
King whiting or "kingfish".....	488	29						
Mackerel.....	589,684	9,140						
Menhaden.....	1,412	33						
Pollock.....	30,626	324					1,100	20
Scup or porgy.....	1,949,419	49,078						
Sea bass.....	62,542	2,574						
Sea robin.....	79,002	934						
Shad.....	3,847	155						
Sharks.....	200	2						
Skates.....	8,229	82					902,860	6,987
Squeteagues or "sea trout", gray.....	33,525	2,704						
Striped bass.....	1,525	183						
Sturgeon.....	200	20						
Tautog.....	36,240	1,315	12,700	318				
Tuna or "horse mackerel".....	2,033	102						
White perch.....	1,500	60						
Whiting.....	536,366	5,358					204,575	5,571
Squid.....	806,375	15,786					1,200	36
Total.....	5,262,651	125,170	62,300	2,490	75,000	2,150	5,706,765	124,442

*Fisheries of Rhode Island, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Eel		Lobster		Periwinkle or cockle			
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Eels.....	81, 150	\$5, 071						
Swordfish.....							399, 110	\$42, 259
Crabs, hard.....			39, 120	\$5, 827				
Lobsters.....			1, 257, 204	203, 255				
Clams, cockle.....			33, 300	1, 715	154, 326	\$8, 307		
Total.....	81, 150	5, 071	1, 329, 624	210, 797	154, 326	8, 307	399, 110	42, 259

Species	Spears		Dredges					
			Clams		Oyster		Scallop	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Eels.....	17, 560	\$1, 170						
Clams, hard, public.....			322, 400	\$38, 858				
Oysters:								
Market, private, spring.....					951, 375	\$176, 381		
Market, private, fall.....					3, 036, 501	518, 494		
Scallops, bay.....							131, 859	\$39, 436
Total.....	17, 560	1, 170	322, 400	38, 858	3, 987, 876	694, 875	131, 859	39, 436

Species	Tongs		Rakes		Forks		Hoes	
Clams:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Hard, public.....	892, 925	\$111, 339	97, 075	\$12, 390				
Soft, public.....					11, 020	\$1, 690	2, 720	\$280
Oysters:								
Market, public, fall.....	1, 300	250						
Market, private, fall.....	1, 300	250						
Total.....	895, 525	111, 839	97, 075	12, 390	11, 020	1, 690	2, 720	280

## SEED OYSTER FISHERY: BY GEAR

Operating units							Rakes	
Fishermen, on boats and shore:							<i>Number</i>	
Regular.....								10
Apparatus:								
Number.....								10
Catch							Bushels	Value
Oysters, seed, public, fall.....							1, 022	\$307

NOTE.—Of the persons and gear employed in the seed oyster fishery all are duplicated among those in the market oyster fishery or fisheries for other species.



## CONNECTICUT

*Fisheries of Connecticut, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines, mackerel	Haul seines	Gill nets			Lines		Pound nets
			Anchor	Drift	Stake	Hand	Trawl	
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	7					31	28	
On boats and shore:								
Regular.....	6	5	2	1		114	7	17
Casual.....		104		69	10	33		
Total.....	13	109	2	70	10	178	35	17
Motor.....	2					9	2	
Net tonnage.....	21					118	71	
<b>Boats:</b>								
Motor.....	2	1	2	37		93	3	9
Other.....	2	34		10	8		1	5
Accessory boats.....						5	19	
<b>Apparatus:</b>								
Number.....	4	28	2	50	21	332	841	14
Length, yards.....	730	3,482						
Square yards.....			2,040	15,250	2,760			
Hooks, baits, or snoods.....						350	37,800	

Item	Fyke nets	Dip nets	Otter trawls	Pots			Harpoons
				Crab	Eel	Lobster	
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			216			8	73
On boats and shore:							
Regular.....	1	2	107		6	170	17
Casual.....	24	21		1	45	25	6
Total.....	25	23	323	1	51	203	96
<b>Vessels:</b>							
Steam.....			5				
Net tonnage.....			963				
Motor.....			45			4	18
Net tonnage.....			548			30	272
Total vessels.....			50			4	18
Total net tonnage.....			1,511			30	272
<b>Boats:</b>							
Motor.....			58		1	151	10
Other.....	16	16		1	49	17	3
Accessory boats.....			1				17
<b>Apparatus:</b>							
Number.....	103	23	108	12	1,339	16,773	28
Yards at mouth.....			3,331				

Item	Spears	Dredges		Tongs	Rakes	Hoes	Total, exclusive of duplication
		Oyster	Scallop				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		130	8				400
On boats and shore:							
Regular.....	6			13	4	11	258
Casual.....	50			153	100	84	582
Total.....	56	130	8	166	104	95	1,240
<b>Vessels:</b>							
Steam.....		4					9
Net tonnage.....		901					1,864
Motor.....		17	1				69
Net tonnage.....		300	55				965
Total vessels.....		21	1				78
Total net tonnage.....		1,201	55				2,829
<b>Boats:</b>							
Motor.....				2		2	238
Other.....	39			110	37	49	311
Accessory boats.....							42
<b>Apparatus:</b>							
Number.....	56	48	2	166	104	95	
Yards at mouth.....		76	7				

*Fisheries of Connecticut, 1932—Continued*

## CATCH: BY GEAR

Species	Purse seines, mackerel		Haul seines		Gill nets					
					Anchor		Drift		Stake	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives.....			9, 500	\$95						
Bluefish.....					2, 000	\$260				
Carp.....			25, 658	2, 160					10, 272	\$767
Mackerel.....	115, 020	\$2, 260								
Minnows.....			4, 900	161						
Mummichog.....			4, 250	43						
Shad.....			29, 652	2, 940			40, 180	\$5, 454		
Smelt.....			3, 124	312						
Squeteagues, or "sea trout", gray.....					848	77				
Striped bass.....					1, 500	300				
Suckers.....			60, 235	2, 526						
Tomcod.....			626	63						
Total.....	115, 020	2, 260	137, 945	8, 300	4, 348	637	40, 180	5, 454	10, 272	767

Species	Lines				Pound nets		Fyke nets	
	Hand		Trawl					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives								
Bluefish	274, 556	\$23,436			1, 876	\$28	7, 963	\$98
Bonito	47	3			9, 179	846		
Butterfish								
Carp					15, 406	1, 138		
Catfish and bullheads							5, 500	525
Cod	61, 273	1, 180	369, 968	\$6, 698			1, 600	32
Cusk			13, 408	150				
Eels			3, 979	205	1, 949	237	7, 942	759
Flounders					13, 585	1, 062		
Haddock			454, 887	8, 215				
Hake			67, 260	507				
Halibut			8, 000	300				
Mackerel					4, 533	367		
Menhaden					5, 320	203		
Pollock	12, 600	504	33, 407	150				
Scup or porgy					200	40		
Sea bass	24, 196	1, 734						
Sharks			230	2	1, 750	13		
Squeteagues, or "sea trout", gray	537	56			14, 250	1, 623	500	50
Striped bass	1, 200	120			964	143		
Suckers							34, 351	1, 665
Tautog	49, 630	2, 793			4, 228	235		
Tilefish			249, 207	10, 576				
Tuna or "horse mackerel"	58	2						
White perch							525	133
Yellow perch							125	40
Squid					8, 865	521		
Total	424, 097	29, 828	1, 200, 346	26, 803	82, 115	6, 456	58, 506	3, 302

## Fisheries of Connecticut—Continued

## CATCH: BY GEAR—Continued

Species	Dip nets		Otter trawls		Pots			
					Crab		Eel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			258	\$17				
Butterfish.....			2,100	105				
Cod.....			1,482,304	38,026				
Cusk.....			94,294	2,153				
Eels.....			660	14			92,367	\$8,700
Flounders.....			8,533,940	186,516				
Goosefish.....			2,332	23				
Haddock.....			3,365,977	104,151				
Hake.....			113,875	2,643				
Halibut.....			22,005	3,357				
Minnows.....	500	\$25						
Pollock.....			233,602	3,525				
Rosefish.....			5,159	134				
Scup or porgy.....			63,007	2,490				
Sea bass.....			100,638	6,251				
Sea robin.....			30,378	241				
Shad.....	693	69						
Sharks.....			137,138	1,170				
Squeteagues, or "sea trout", gray.....			360	22				
Tautog.....			14,319	470				
Tomcod.....							1,624	162
Whiting.....			29,399	248				
Wolfish.....			46,042	906				
Crabs:								
Hard.....	8,181	482			428	\$13		
Soft.....	1,095	425						
Lobsters.....			85	17				
Squid.....			3,140	33				
Total.....	10,469	1,001	14,281,012	352,512	428	13	93,931	8,862

Species	Pots—Con.		Harpoons		Spears		Dredges			
	Lobster						Oyster		Scallop	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels					89, 116	\$5, 973				
Swordfish			381, 461	\$38, 390						
Tautog	8, 532	\$597								
Tuna or "horse mackerel"			2, 800	231						
Crabs, hard	18, 642	373								
Lobsters	598, 724	141, 131								
Oysters:										
Market, private, spring							1, 149, 678	\$151, 961		
Market, private, fall							1, 917, 554	252, 300		
Periwinkles	6, 700	84								
Scallops, sea									94, 527	\$8, 928
Total	632, 598	142, 185	384, 261	38, 621	89, 116	5, 973	3, 067, 232	404, 261	94, 527	8, 928

Species	Tongs		Rakes		Hoes	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Hard, public.....	93,030	\$20,106	98,760	\$25,098		
Soft, public.....					14,090	\$3,027
Oysters:					64,262	9,041
Market, public, spring.....	23,166	3,058	1,013	300		
Market, public, fall.....	11,475	1,200				
Market, private, spring.....	5,400	1,125				
Market, private, fall.....	8,100	1,500				
Total.....	141,171	26,989	99,773	25,398	78,352	12,068

*Fisheries of Connecticut—Continued*

## SEED OYSTER FISHERY: BY GEAR

Item	Oyster dredges	Tongs	Rakes	Total, exclusive of duplication
<b>OPERATING UNITS</b>				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	79			79
On boats and shore:				
Regular.....		6		6
Casual.....	12	123	41	172
<b>Total</b> .....	91	129	41	257
<b>Vessels:</b>				
Steam.....	4			4
Net tonnage.....	344			344
Motor.....	13			13
Net tonnage.....	140			140
Sail.....	3			3
Net tonnage.....	23			23
<b>Total vessels</b> .....	20			20
<b>Total net tonnage</b> .....	507			507
<b>Boats:</b>				
Motor.....	6			6
Other.....		93	19	112
<b>Apparatus:</b>				
Number.....	97	129	41	267
Length, yards.....	88			88
<b>CATCH</b>				
<b>Oysters:</b>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>
Seed, public, spring.....	23, 104	\$12, 507	4, 260	\$2, 343
Seed, public, fall.....	19, 316	8, 985	20, 989	9, 535
Seed, private, spring.....	135, 256	73, 840	1, 100	605
Seed, private, fall.....	19, 000	9, 000	1, 200	600
<b>Total</b> .....	196, 676	104, 332	27, 549	13, 083
			3, 945	2, 063
				228, 170
				119, 478

NOTE.—Of the number of persons fishing for seed oysters none in the dredge fishery, 108 in the fishery by tongs, and all in the fishery by rakes are duplicated among those fishing in the market oyster fishery or in fisheries for other species. Similarly, none of the vessels, none of the motor boats or dredges was duplicated in the dredge fishery; 81 of the other boats, and 112 tongs were duplicated in the fishery by tongs; and all other boats and rakes were duplicated in the fishery by rakes.

**VESSEL FISHERIES AT THE PRINCIPAL NEW ENGLAND PORTS****ECONOMIC ASPECT**

The landings of fishery products at the 3 principal New England ports (Boston and Gloucester, Mass., and Portland, Maine), by vessels of 5 net tons and over, during 1932, amounted to 252,334,325 pounds as landed, valued at \$6,083,851. This is a decrease of 4 percent in the quantity of the catch as compared with 1931, and a decrease of 34 percent in the value of the catch. Of the total landings 99 percent consisted of fresh fish and 1 percent, salted fish. The landings at Boston accounted for 215,618,979 pounds, valued at \$5,366,925 or 85 percent of the total quantity. The landings at Gloucester in 1932 amounted to 25,328,213 pounds, valued at \$434,076 or 10 percent of the total quantity. Landings at Portland amounted to 11,387,133 pounds, valued at \$282,850, or 5 percent of the total landings.

Among the landings of fresh fish, haddock outranked other species in volume landed, the amount of all sizes in 1932 being 120,116,874 pounds or 48 percent of the total fresh fish.

*Landings by fishing vessels at principal New England ports, 1932*

## BOSTON: BY MONTHS

Species	January		February		March		April	
Cod, fresh:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Large	1,812,800	\$53,097	2,397,825	\$90,181	3,352,945	\$105,495	2,467,689	\$36,395
Market	1,963,185	48,450	1,419,820	43,138	2,212,555	54,627	1,900,153	20,345
Scrod	40,960	775	17,940	359	28,075	396		
Cod, salted:							3,700	92
Haddock, fresh:								
Large	5,885,565	238,511	9,165,780	335,958	9,563,825	294,547	11,676,315	187,317
Scrod	2,101,119	47,701	3,209,090	78,035	2,051,440	48,627	1,223,170	12,289
Hake, fresh:								
Large	616,150	14,435	638,230	21,525	398,261	14,206	212,400	3,603
Small	800	11			800	32	1,000	40
Pollock, fresh	752,300	7,668	588,445	14,529	479,785	13,867	663,290	4,673
Pollock, salted							7,300	73
Cusk, fresh	500,070	8,519	263,160	6,717	124,670	3,173	157,970	1,646
Halibut, fresh	65,982	12,657	158,183	27,369	138,390	17,375	263,210	31,184
Mackerel, fresh					120	10		
Flounders, fresh	708,113	37,507	595,766	37,063	521,847	30,551	559,325	16,919
Other, fresh	174,382	3,533	231,565	5,490	348,140	9,487	428,105	6,431
Total, fresh	14,621,426	472,864	18,685,804	660,364	19,220,853	592,393	19,552,627	320,842
Total, salted							11,000	165
Grand total	14,621,426	472,864	18,685,804	660,364	19,220,853	592,393	19,563,627	321,007
Landed in 1931: Fresh	16,449,890	688,271	19,180,475	793,063	25,772,140	887,774	19,606,998	438,496

  

Species	May		June		July	
Cod, fresh:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Large	1,786,817	\$33,189	1,318,563	\$38,122	1,701,640	\$30,411
Market	1,853,664	21,473	1,537,119	23,951	3,203,475	31,765
Scrod	200	2	100	1		
Cod, salted:						
Large	10,000	300	16,000	493	700	14
Market			8,000	248	450	11
Haddock, fresh:						
Large	7,767,205	157,897	5,962,335	149,591	6,555,835	126,379
Scrod	2,437,390	20,414	2,539,610	21,084	1,994,270	15,968
Hake, fresh:						
Large	172,825	2,903	195,955	2,051	132,760	1,048
Small	4,500	92	1,500	15	6,400	44
Pollock, fresh	276,047	3,024	170,340	2,148	214,180	1,965
Cusk, fresh	283,520	2,339	176,665	1,371	90,655	825
Halibut, fresh	382,242	34,102	255,333	28,985	252,975	25,684
Mackerel, fresh	3,885,771	98,252	4,056,140	94,441	3,247,779	47,373
Flounders, fresh	660,535	12,281	492,755	10,226	240,365	8,987
Swordfish, fresh			194,940	44,899	633,403	96,309
Herring, fresh			4,000	30		
Other, fresh	262,471	3,198	140,922	1,834	79,405	1,557
Total, fresh	19,773,187	389,166	17,046,277	418,749	18,353,142	388,315
Total, salted	10,000	300	24,000	741	1,150	25
Grand total	19,783,187	389,466	17,070,277	419,490	18,354,292	388,340
Landed in 1931:						
Fresh	18,028,617	514,462	18,675,995	664,482	19,650,407	720,438
Salted	8,290	269				
Total	18,036,907	514,731	18,675,995	664,482	19,650,407	720,438

NOTE.—The weights of fresh and salted fish given in these statistics represent the fish as landed from the vessels, and the values are those received by the fishermen. Large cod are classified as those weighing over 10 pounds; market cod,  $2\frac{1}{2}$  to 10 pounds; and scrod cod, 1 to  $2\frac{1}{2}$  pounds. Large haddock are those weighing  $2\frac{1}{2}$  pounds and scrod haddock, 1 to  $2\frac{1}{2}$  pounds. Large hake are those weighing over 6 pounds and small hake, under 6 pounds. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation.

## Landings by fishing vessels at principal New England ports, 1932—Continued

BOSTON: BY MONTHS—Continued

Species	August		September		October		November	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:								
Large	1,583,130	\$31,045	1,052,973	\$33,336	1,347,785	\$39,668	1,233,342	\$47,623
Market	3,701,215	29,933	2,400,685	35,860	2,713,595	44,465	2,351,665	58,195
Scrod	1,000	5	160	2	1,000	10	900	9
Cod, salted:								
Large	630	19			15,000	510	1,785	90
Market	16,550	166					7,360	162
Haddock, fresh:								
Large	6,777,285	136,632	7,546,640	160,329	6,444,020	171,031	4,880,995	196,513
Scrod	2,772,740	19,141	3,919,780	31,009	2,918,710	35,460	1,504,445	39,819
Hake, fresh:								
Large	418,985	2,825	373,150	4,750	758,455	7,685	826,535	15,616
Small					500	5	3,500	79
Pollock, fresh	317,025	2,539	246,271	2,847	466,145	3,429	711,230	6,373
Cusk, fresh	28,695	358	82,445	1,084	167,085	2,326	333,115	5,315
Halibut, fresh	304,238	26,808	141,756	15,699	73,233	8,577	22,497	4,918
Mackerel, fresh	3,433,666	53,264	4,016,830	54,572	4,895,288	56,576	1,338,680	39,387
Flounders, fresh	353,665	12,012	407,970	20,543	592,940	21,024	902,075	35,706
Swordfish, fresh	1,077,157	113,544	344,447	58,198	7,575	2,142		
Herring, fresh	3,000	45						
Other, fresh	58,980	2,445	40,054	2,185	74,848	3,640	67,046	3,374
Total, fresh	20,830,781	430,596	20,573,161	420,414	20,461,179	396,038	14,176,025	452,927
Total, salted	17,180	185			15,000	510	9,145	252
Grand total	20,847,961	430,781	20,573,161	420,414	20,476,179	396,548	14,185,170	453,179
Landed in 1931:								
Fresh	19,054,222	787,485	18,084,618	745,525	16,498,909	670,316	16,315,902	535,637
Salted			7,400	291				
Total	19,054,222	787,485	18,092,018	745,816	16,498,909	670,316	16,315,902	535,637

Species	December		Total, 1932		1931	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod fresh:						
Large	1,389,665	\$48,144	21,445,174	\$586,706	23,932,629	\$794,081
Market	1,660,515	41,833	26,917,646	454,035	25,730,600	620,059
Scrod	10,680	178	101,015	1,737	244,345	3,882
Cod, salted:						
Large			47,815	1,518	12,690	440
Market			32,360	587		
Haddock, fresh:						
Large	4,858,175	213,442	87,083,975	2,368,147	106,028,345	3,819,572
Scrod	977,990	29,805	27,649,754	399,352	14,258,395	261,610
Hake, fresh:						
Large	903,795	20,529	5,647,501	111,176	5,860,915	142,802
Small			19,000	318	43,420	1,144
Hake, salted:						
Small	4,000	80	4,000	80		
Pollock, fresh	890,385	7,540	5,775,443	70,602	5,027,987	83,717
Pollock, salted			7,300	73		
Cusk, fresh	284,545	4,514	2,492,595	38,187	3,447,091	68,290
Halibut, fresh	26,137	5,818	2,084,176	239,176	2,309,826	341,734
Mackerel, fresh	400,200	16,339	25,274,474	460,214	19,855,052	889,633
Mackerel, salted					3,000	120
Flounders, fresh	761,448	31,860	6,796,804	274,679	9,493,487	420,205
Swordfish, fresh			2,257,522	315,092	1,526,342	399,629
Herring, fresh	500	15	7,500	90	5,700	142
Other, fresh	69,007	1,982	1,974,925	45,156	2,165,179	59,434
Total, fresh	12,233,042	421,999	215,527,504	5,364,667	219,929,313	7,905,934
Total, salted	4,000	80	91,475	2,258	15,690	560
Grand total	12,237,042	422,079	215,618,979	5,366,925	219,945,003	7,906,494
Landed in 1931:						
Fresh	12,611,140	459,985			219,929,313	7,905,934
Salted					15,690	560
Total	12,611,140	459,985			219,945,003	7,906,494

*Landings by fishing vessels at principal New England ports, 1933—Continued*

## GLOUCESTER: BY MONTHS

Species	January		February		March		April	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:								
Large.....	145,780	\$5,881	298,820	\$15,391	355,960	\$10,571	936,850	\$16,624
Market.....	4,615	113	2,480	71	25,730	281	252,155	2,522
Scrod.....	295	4	115	1			50	
Haddock, fresh:								
Large.....	53,575	2,393	83,700	3,454	326,620	8,900	872,655	17,280
Scrod.....	9,960	170	4,190	60	1,470	30	2,840	15
Hake, fresh:								
Large.....	31,380	473	20,680	376	15,016	261	1,940	14
Pollock, fresh.....	6,715	83	240	4	6,145	42	31,900	228
Cusk, fresh.....	150	3	160	3	1,895	20	8,105	59
Halibut, fresh.....	89	21	10	2	19	3		
Flounders, fresh.....	97,375	4,344	39,995	1,906	35,930	1,992	16,075	343
Other, fresh.....	6,445	35	7,270	52	4,280	26	490	3
Total, fresh.....	356,379	13,520	457,680	21,320	773,065	22,126	2,126,060	37,088
Landed in 1931:								
Fresh.....	867,918	30,642	586,930	27,504	1,431,771	41,486	3,259,315	71,660
Salted.....	1,441,368	51,915					117,481	4,422
Total.....	2,309,286	82,557	586,930	27,504	1,431,771	41,486	3,376,796	76,082

  

Species	May		June		July	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:						
Large.....	987,780	\$17,424	431,685	\$9,475	342,210	\$6,012
Market.....	398,760	3,738	106,915	1,072	399,910	3,999
Scrod.....	40				340	2
Cod, salted:						
Large.....	111,445	3,095	104,200	3,127	144,240	4,798
Market.....	8,645	155	13,010	262	131,264	3,248
Scrod.....					25,400	381
Haddock, fresh:						
Large.....	260,605	4,802	80,682	1,056	187,780	1,894
Scrod.....	7,750	59	13,000	103	111,015	833
Hake, fresh:						
Large.....	11,400	65	37,175	279	47,220	395
Hake, salted:						
Large.....	470	5				
Pollock, fresh.....	19,430	126	4,130	28	34,940	218
Pollock, salted.....			95	1	1,200	12
Cusk, fresh.....	21,840	129	93,185	690	39,555	305
Cusk, salted.....	120	2	260	3	1,200	15
Halibut, salted.....			505	36		
Mackerel, fresh.....	279,955	4,341	754,315	12,043	1,328,100	13,710
Flounders, fresh.....	8,780	205	21,730	570	53,300	1,219
Swordfish, fresh.....					3,283	382
Herring, fresh.....	19,000	190			2,000	20
Herring, salted.....	134,800	5,055				
Other, fresh.....	150	2	3,488	75	1,175	30
Total, fresh.....	2,015,490	31,081	1,546,305	25,391	2,550,828	29,019
Total, salted.....	255,480	8,312	118,070	3,429	303,304	8,454
Grand total.....	2,270,970	39,393	1,664,375	28,820	2,854,132	37,473
Landed in 1931:						
Fresh.....	2,149,496	52,449	1,109,150	34,163	1,844,862	52,817
Salted.....	263,360	9,037	148,160	5,063	122,725	4,073
Total.....	2,412,856	61,486	1,257,310	39,226	1,967,587	56,890

## Landings by fishing vessels at principal New England ports, 1932—Continued

## GLOUCESTER: BY MONTHS—Continued

Species	August		September		October		November	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:								
Large	413,805	\$6,214	366,756	\$15,658	467,160	\$16,925	73,635	\$3,352
Market	512,680	5,125	57,565	577	44,795	452	2,135	40
Scrod	1,480	8			135	3	10	
Cod, salted:								
Large	82,560	2,564	148,250	4,532	69,570	2,126		
Market	7,075	151	91,480	1,833	164,085	4,156		
Scrod			85,665	857	10,900	109		
Haddock, fresh:								
Large	143,790	1,456	85,780	1,469	58,795	1,576	26,285	1,087
Scrod	41,895	316	18,440	92	6,170	51	200	4
Hake, fresh:								
Large	26,225	155	125,595	1,458	581,195	3,122	74,405	1,418
Hake, salted:								
Large	575	9						
Pollock, fresh	45,855	298	75,845	1,237	314,320	1,839	476,385	3,987
Cusk, fresh	59,312	407	5,110	33	6,450	43	670	6
Cusk, salted	2,420	37						
Halibut, fresh	29,472	2,432	105,348	5,982	11,385	1,594	15,984	1,752
Halibut, salted	245	17	90	6				
Mackerel, fresh	2,027,235	20,591	3,090,597	29,606	2,644,180	18,219	486,838	21,880
Mackerel, salted	5,050	180	7,075	93	11,100	423		
Flounders, fresh	19,750	693	425	19	23,165	553	30,355	1,025
Swordfish, fresh	3,072	277	677	130				
Other, fresh	142,500	1,074	52,100	359	3,990	270	3,890	62
Total, fresh	3,467,071	39,047	3,984,238	56,620	4,161,740	44,647	1,190,792	34,613
Total, salted	97,925	2,958	332,560	7,321	255,655	6,814		
Grand total	3,564,996	42,005	4,316,798	63,941	4,417,395	51,461	1,190,792	34,613
Landed in 1931:								
Fresh	3,452,270	101,021	2,996,267	94,280	1,274,255	49,638	1,737,836	64,105
Salted	537,939	17,356	69,505	2,448	41,390	1,398		
Total	3,990,209	118,377	3,065,772	96,728	1,315,645	51,036	1,737,836	64,105

Species	December		Total, 1932		1931	
	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:						
Large	62,720	\$2,743	4,883,161	\$126,270	4,670,912	\$151,511
Market	5,930	122	1,813,670	18,113	897,257	14,215
Scrod	655	6	3,120	24	10,440	159
Cod, salted:						
Large			660,265	20,242	1,028,832	36,262
Market			415,559	9,805	201,532	5,015
Scrod			121,965	1,347	5,645	85
Haddock, fresh:						
Large	32,290	1,359	2,212,557	46,726	4,847,223	134,093
Scrod	1,155	19	218,085	1,752	207,750	2,485
Haddock, salted:						
Large					810	12
Hake, fresh:						
Large	56,920	1,295	1,029,151	9,311	596,375	11,480
Small					1,130	12
Hake, salted:						
Large			1,045	14	5,100	66
Pollock, fresh	156,045	1,554	1,174,950	9,644	1,397,103	19,313
Pollock, salted			1,295	13	1,262	24
Cusk, fresh	405	4	236,857	1,702	140,990	1,674
Cusk, salted			4,000	57	4,805	93
Halibut, fresh	13	1	162,320	11,787	55,469	5,632
Halibut, salted			840	59	245	30
Mackerel, fresh	419,788	17,953	11,031,008	138,343	7,298,373	273,477
Mackerel, salted			23,225	696	52,329	2,210
Flounders, fresh	69,115	2,111	415,995	14,980	468,675	21,199
Swordfish, fresh			7,032	789	10,620	2,690
Herring, fresh			21,000	210	204,700	3,684
Herring, salted	520,900	15,075	655,700	20,130	2,286,876	80,589
Other, fresh	9,635	74	235,413	2,062	455,350	9,813
Total, fresh	814,671	27,241	23,444,319	381,713	21,262,367	651,437
Total, salted	520,900	15,075	1,883,894	52,363	3,587,436	124,386
Grand total	1,335,571	42,316	25,328,213	434,076	24,849,803	775,823
Landed in 1931:						
Fresh	552,297	31,672			21,262,367	651,437
Salted	845,508	28,674			3,587,436	124,386
Total	1,397,805	60,346			24,849,803	775,823



## Landings by fishing vessels at principal New England ports, 1932—Continued

## PORTLAND: BY MONTHS

Species	January		February		March		April	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:								
Large	76,085	\$2,516	69,497	\$2,830	109,999	\$3,790	377,970	\$6,009
Market	47,694	938	32,709	809	66,704	1,364	156,925	1,602
Scrod	3,580	37	1,035	11	445	4	1,840	11
Cod, salted:								
Large							885	27
Market							610	12
Haddock, fresh:								
Large	189,387	10,094	191,402	9,208	417,451	12,276	895,379	13,574
Scrod	3,690	48	1,178	14	2,171	21	1,535	8
Hake, fresh:								
Large	29,835	510	31,819	922	30,054	708	16,294	220
Small	66,963	1,201	49,857	1,344	50,206	1,169	15,049	168
Pollock, fresh	72,635	364	48,946	526	29,785	417	64,286	465
Pollock, salted							265	1
Cusk, fresh	45,845	813	50,618	1,219	70,174	1,498	51,187	576
Cusk, salted							90	1
Halibut, fresh	196	35	411	87	130	21	19,134	1,532
Flounders, fresh	16,645	652	4,993	186	26,183	1,101	20,395	231
Other, fresh	32,388	676	32,822	796	40,774	895	56,856	1,086
Total, fresh	584,943	17,884	515,287	17,952	844,076	23,264	1,676,850	25,482
Total, salted							1,850	41
Grand total	584,943	17,884	515,287	17,952	844,076	23,264	1,678,700	25,523
Landed in 1931:								
Fresh	833,153	31,783	633,840	25,073	1,855,017	51,570	6,146,501	144,198

  

Species	May		June		July	
	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:						
Large	220,485	\$3,248	258,012	\$7,014	428,055	\$10,381
Market	88,759	834	31,623	339	17,180	175
Scrod	1,320	7	3,630	20	550	3
Cod, salted:						
Large	3,385	107	1,785	61	251	10
Market	1,615	37	1,330	33	250	5
Scrod	35	1			55	1
Haddock, fresh:						
Large	234,291	3,738	148,339	4,688	133,265	4,304
Scrod	250	1	5,625	31	7,103	41
Hake, fresh:						
Large	10,019	117	9,195	45	6,915	47
Small	41,795	426	49,512	312	46,925	323
Hake, salted:						
Small			280	1		
Pollock, fresh	85,790	311	54,140	286	88,582	446
Pollock, salted	350	2				
Cusk, fresh	15,003	146	1,845	8	1,516	9
Cusk, salted	70	1				
Halibut, fresh	25,867	2,303	40,224	3,890	6,277	682
Mackerel, fresh	2,410	96	25,500	615	164,151	1,924
Flounders, fresh	27,237	380	16,105	429	29,128	587
Swordfish, fresh			26,358	4,890	104,555	13,446
Herrins, fresh	32,000	160	39,000	195		
Other, fresh	3,379	45	22,061	421	37,918	555
Total, fresh	788,605	11,812	730,969	23,183	1,072,120	32,923
Total, salted	5,455	148	3,395	95	556	16
Grand total	794,060	11,960	734,364	23,278	1,072,676	32,939
Landed in 1931:						
Fresh	862,575	19,695	681,602	28,120	912,444	57,691
Salted			6,905	217	4,275	146
Total	862,575	19,695	688,507	28,337	916,719	57,837

*Landings by fishing vessels at principal New England ports, 1932—Continued*

## PORTLAND: BY MONTHS—Continued

Species	August		September		October		November	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:								
Large	347,371	\$11,688	327,128	\$14,388	146,212	\$5,060	79,103	\$3,455
Market	15,616	146	20,978	309	31,435	412	27,887	532
Scrod	1,065	6	2,265	15	3,087	21	2,135	18
Haddock, fresh:								
Large	126,788	4,870	93,362	4,861	144,330	7,026	137,857	7,755
Scrod	9,150	78	7,932	65	12,625	124	10,106	92
Hake, fresh:								
Large	2,420	17	6,185	96	3,650	27	2,995	60
Small	46,125	334	88,855	888	145,468	1,486	152,601	2,927
Hake, salted:								
Small							175	3
Pollock, fresh	107,473	536	103,537	697	84,427	425	71,360	448
Cusk, fresh	1,401	12	6,772	83	26,130	321	24,696	481
Halibut, fresh	12,734	1,267	676	45	1,514	154	817	104
Halibut, salted							195	6
Mackerel, fresh	664,273	9,690	788,396	4,789	30,621	1,267	2,170	182
Mackerel, salted	55,000	413	35,500	178				
Flounders, fresh	38,895	853	18,155	466	15,047	335	1,822	87
Swordfish, fresh	132,183	12,574	73,553	9,599	2,712	543		
Other, fresh	70,901	778	156,794	527	32,545	639	24,956	466
Total, fresh	1,576,395	42,849	1,694,588	36,828	679,803	17,840	538,505	16,607
Total, salted	55,000	413	35,500	178			370	9
Grand total	1,631,395	43,262	1,730,088	37,006	679,803	17,840	538,875	16,616
Landed in 1931:								
Fresh	2,403,087	91,593	1,501,536	43,717	1,543,243	35,166	862,319	20,902
Salted	19,850	460	26,625	960	85	3		
Total	2,422,937	92,053	1,528,161	44,677	1,543,328	35,169	862,319	20,902

Species	December		Total, 1932		1931	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:						
Large	67,522	\$2,278	2,507,439	\$72,657	3,314,761	\$119,625
Market	30,009	542	567,519	8,002	514,116	11,069
Scrod	2,980	23	23,932	176	33,364	314
Cod, salted:						
Large			6,366	205	41,635	1,512
Market			3,805	87	6,070	155
Scrod			90	2	115	2
Haddock, fresh:						
Large	170,286	7,819	2,882,137	90,213	7,429,541	215,848
Scrod	9,001	95	70,366	618	73,401	749
Hake, fresh:						
Large	46,055	782	195,436	3,551	310,323	5,993
Small	95,175	1,560	848,531	12,138	938,564	16,484
Hake, salted:						
Small			455	4	155	1
Pollock, fresh	79,678	433	890,639	5,354	1,205,240	10,684
Pollock, salted			615	3	10	
Cusk, fresh	40,201	651	335,388	5,817	671,521	13,148
Cusk, salted			160	2	200	3
Halibut, fresh	553	71	108,533	10,191	204,696	28,470
Halibut, salted			195	6		
Mackerel, fresh			1,677,321	18,563	2,305,421	60,120
Mackerel, salted			90,500	591	9,555	113
Flounders, fresh	15,429	551	230,034	5,858	313,182	9,461
Swordfish, fresh			339,361	41,052	223,367	56,426
Herring, fresh			71,000	355	667,430	4,670
Other, fresh	25,977	521	537,371	7,405	627,111	12,093
Total, fresh	582,866	15,326	11,285,007	281,950	18,832,038	565,154
Total, salted			102,126	900	57,740	1,786
Grand total	582,866	15,326	11,387,133	282,850	18,889,778	566,940
Landed in 1931:						
Fresh	596,721	15,646			18,832,038	565,154
Salted					57,740	1,786
Total	596,721	15,646			18,889,778	566,940

*Landings by fishing vessels at principal New England ports, 1932—Continued*

## SUMMARY: BY PORTS

Species	Boston		Gloucester		Portland	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:						
Large	21,445,174	\$586,706	4,883,161	\$120,270	2,507,439	\$72,657
Market	26,917,646	454,035	1,813,670	18,113	567,519	8,002
Scrod	101,015	1,737	3,120	24	23,932	176
Cod, salted:						
Large	47,815	1,518	660,265	20,242	6,306	205
Market	32,360	587	415,559	9,805	3,805	87
Scrod			121,965	1,347	90	2
Haddock, fresh:						
Large	87,083,975	2,368,147	2,212,557	46,726	2,882,137	90,213
Scrod	27,649,754	399,352	218,085	1,752	70,366	618
Hake, fresh:						
Large	5,647,501	111,176	1,029,151	9,311	195,436	3,551
Small	19,000	318			848,531	12,138
Hake, salted:						
Large			1,045	14		
Small	4,000	80			455	4
Pollock, fresh	5,775,443	70,602	1,174,950	9,644	890,639	5,354
Pollock, salted	7,300	73	1,295	13	615	3
Cusk, fresh	2,492,595	38,187	236,857	1,702	335,388	5,817
Cusk, salted			4,000	57	160	2
Halibut, fresh	2,084,176	239,176	162,320	11,787	108,533	10,191
Halibut, salted			840	59	195	6
Mackerel, fresh	25,274,474	460,214	11,031,008	138,343	1,677,321	18,563
Mackerel, salted			23,225	696	90,500	591
Flounders, fresh	6,796,804	274,679	415,995	14,980	230,034	5,858
Swordfish, fresh	2,257,522	315,092	7,032	789	339,361	41,052
Herring, fresh	7,500	90	21,000	210	71,000	355
Herring, salted			655,700	20,130		
Other, fresh	1,974,925	45,156	235,413	2,062	537,371	7,405
Total, fresh	215,527,504	5,364,667	23,444,319	381,713	11,285,007	281,950
Total, salted	91,475	2,258	1,883,894	52,363	102,126	900
Grand total	215,618,979	5,366,925	25,328,213	434,076	11,387,133	282,850
Landed in 1931:						
Fresh	219,929,313	7,905,934	21,262,367	651,437	18,832,038	565,154
Salted	15,690	560	3,587,436	124,386	57,740	1,786
Total	219,945,003	7,906,494	24,849,803	775,823	18,889,778	566,940

Species	Total, 1932		1931	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Cod, fresh:				
Large	28,835,774	\$785,633	31,918,302	\$1,065,217
Market	29,298,835	480,150	27,141,973	645,343
Scrod	128,067	1,937	288,149	4,355
Cod, salted:				
Large	714,386	21,965	1,083,157	38,214
Market	451,724	10,479	207,602	5,170
Scrod	122,055	1,349	5,760	87
Haddock, fresh:				
Large	92,178,669	2,505,086	118,305,109	4,169,513
Scrod	27,938,205	401,722	14,539,546	264,844
Haddock, salted:				
Large			810	12
Hake, fresh:				
Large	6,872,088	124,038	6,767,613	160,275
Small	867,531	12,456	983,114	17,640
Hake, salted:				
Large	1,045	14	5,100	66
Small	4,455	84	155	1
Pollock, fresh	7,841,032	85,600	7,630,330	113,714
Pollock, salted	9,210	89	1,272	24
Cusk, fresh	3,064,840	45,706	4,259,602	83,112
Cusk, salted	4,160	59	5,005	96
Halibut, fresh	2,355,029	261,154	2,569,991	375,836
Halibut, salted	1,035	65	245	30
Mackerel, fresh	37,982,803	617,120	29,458,846	1,223,230
Mackerel, salted	113,725	1,287	64,884	2,443
Flounders, fresh	7,442,833	295,517	10,275,344	450,865
Swordfish, fresh	2,603,915	356,933	1,760,329	458,745

*Landings by fishing vessels at principal New England ports, 1932—Continued*

## SUMMARY: BY PORTS—Continued

Species	Total, 1932		1931	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Herring, fresh.....	99,500	\$655	877,830	\$8,496
Herring, salted.....	655,700	20,130	2,286,876	80,589
Other, fresh.....	<sup>1</sup> 2,747,709	54,623	3,247,640	81,340
Total, fresh.....	250,256,830	6,028,330	260,023,718	9,122,525
Total, salted.....	2,077,495	55,521	3,660,866	126,732
Grand total.....	252,334,325	6,083,851	263,684,584	9,249,257
Landed in 1931:				
Fresh.....			260,023,718	9,122,525
Salted.....			3,660,866	126,732
Total.....			263,684,584	9,249,257

<sup>1</sup> The items under "Other, fresh" include albacore, 927 pounds, value \$111; alewives, 385,674 pounds, value \$2,017; butterfish, 145,149 pounds, value \$9,058; croaker, 2,400 pounds, value \$72; cunner (perch), 335 pounds, value \$6; eels, 25 pounds, value \$1; rosefish, 57,230 pounds, value \$521; salmon, 18 pounds, value \$3; scup, 6,900 pounds, value \$207; sea bass, 170 pounds, value \$5; shad, 7,351 pounds, value \$213; sharks, 44,428 pounds, value \$486; skates, 14,070 pounds, value \$131; smelt, 3,600 pounds, value \$169; sturgeon, 6,123 pounds, value \$436; tuna or "horse mackerel", 3,244 pounds, value \$137; whiting, 143,445 pounds, value \$4,242; wolffish, 1,583,094 pounds, value \$27,329; lobsters, 162 pounds, value \$41; scallops, 2,307 pounds, value \$576; squid, 100 pounds, value \$4; livers, 280,480 pounds, value \$5,605; and spawn, 60,477 pounds, value \$3,253.

## BIOLOGICAL ASPECT

In 1932 the fishing fleet landing fares at Boston and Gloucester, Mass., and Portland, Maine, and operating on the fishing banks of the North Atlantic from Flemish Cap to New York, numbered 372 steam, motor, and sail vessels of over 5 net tons as measured by the United States Customs Service. These made 11,112 trips to the fishing grounds, and were absent from port 48,729 days, or an average of about 4.4 days per trip. This is 0.4 of a day less than the average length of a trip during 1931. Their catches of edible fish landed at the three ports amounted to 253,907,536 pounds when the salted fish had been converted to the basis of fresh gutted or round fish as landed. This does not represent the entire catch of edible fish of these vessels, for small quantities estimated at not more than 5 percent of their total catch were landed at ports in New England other than these three, at New York City, and at ports in New Jersey.

Otter trawls on all sizes of vessels accounted for 142,196,578 pounds, or 56 percent of the total catch. Line trawls were next in importance, accounting for 57,267,269 pounds, or 23 percent of the total catch landed at the three ports in 1932.

The catch taken on Georges Bank was considerably larger than that taken on any other fishing ground and landed at the three ports in 1932. It amounted to 93,896,295 pounds, or 37 percent of the total catch.

The landings from South Channel amounted to 36,265,135 pounds, or 14 percent of the total and from Browns Bank, 25,712,196 pounds, or 10 percent.

## Landings by fishing vessels at the 3 principal New England ports, 1932

## BY GEAR AND FISHING GROUNDS

Gear and fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
<b>Line trawls:</b>										
Grand Bank.....	3	8	167	20,269	2,228					
St. Peter Bank.....	3	3	56							
Off Newfoundland.....	1	1	10	93,323	86,018	84,808				
Seal Island Grounds.....	6	5	52	50,150	90,200					
Gulf of St. Lawrence.....	3	5	140	431,438	660,013	156,683				
Safari Bank.....	3	3	43	67,296	14,829					
Quebec Bank.....	9	18	379	150,289	10,819					
The Gully.....	3	3	43				1,700			
Sable Island Bank (Western Bank).....	19	30	432	694,260	525,091		1,059,800			
Cape Shore.....	32	81	860	600,588	1,004,040	120	1,293,815	129,370	31,780	
Emerald Bank.....	5	6	86	105,109	66,700		306,400	12,200	8,975	
La Have Bank.....	33	84	1,006	1,204,555	1,236,298	1,400	2,730,027	15,000	132,410	
Roseway Bank.....	3	3	33	44,910	66,240		33,690	500	2,700	
Browns Bank.....	3	3	33							
Georges Bank.....	45	260	2,808	2,577,393	2,817,268	1,720	8,398,445	84,390	463,050	
South Channel.....	45	186	1,992	3,701,784	1,801,120		2,893,480	83,375	309,205	
Georges Bank.....	42	222	1,607	1,894,150	1,473,335	1,900	4,238,695	102,120	1,027,670	1,000
Off Highland Light.....	3	5	40	5,500	2,435		55,400		15,070	
Off Chatham.....	10	17	141	26,260	22,725		138,950	7,975	19,210	
Nantucket Shoals.....	3	3	17	6,950	7,260		12,950	1,000	2,615	
Cashes Bank.....	13	33	159	64,003	51,956	1,881	111,942	5,679	91,995	55,495
Fippies Bank.....	12	23	118	63,515	30,155		95,540	6,075	212,260	6,075
Platts Bank.....	3	5	14	4,760	2,720	625	10,920	1,260	3,170	12,480
Jeffries Bank.....	24	188	451	118,031	82,512	6,160	576,636	25,964	174,950	230,090
Tillies Bank.....	2	2	6	530	350		8,850	150	4,800	
Middle Bank (Stellwagen Bank).....	18	70	348	74,830	39,990		560,885	16,765	324,185	
Shore, general.....	53	280	821	291,841	220,055	16,240	892,637	34,088	258,459	273,613
Total.....	1 109	1,544	11,930	12,156,635	10,314,387	271,917	23,501,062	552,941	3,378,619	578,753
<b>Hand lines:</b>										
Cape Shore.....	2	5	54	54,650	69,160	900	1,360			
Browns Bank.....	7	8	85	135,693	141,850		34,480		50	
Georges Bank.....	7	29	252	691,345	256,395	2,300	9,570		855	
Nantucket Shoals.....	6	25	199	123,790	120,455	100	965			
Shore, general.....	4	5	26	11,499	10,756		230		1,125	
Shore, general (occasional).....				1,007	790	109			60	
Total.....	1 13	72	616	1,017,984	599,406	3,409	46,605		2,090	

† Exclusive of duplication.

## Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

## BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds									
Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
			Large	Market	Scrod	Large	Scrod	Large	Small
			Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Harpoons:									
Cape Shore.....	11	287							
Browns Bank.....	33	687							
Georges Bank.....	66	3,419							
Nantucket Shoals.....	7	112							
Cashes Bank.....	1	15							
South.....	1	4							
Shore, general.....	14	289							
Total.....	169	4,813							
Other trawls, large:									
St. Peters Bank.....	1	17	16,200	54,700		61,500			
Sable Island Bank (Western Bank).....	37	1,093	2,056,207	2,419,050	13,480	5,613,445	440,580	106,795	
Cape Shore.....	3	54	18,185	30,870	1,940	228,610	57,200	19,460	
Emerald Bank.....	4	41	64,550	82,980		194,300	11,100	3,925	
La Have Bank.....	23	39	531,255	682,140	12,160	1,608,690	259,345	86,216	
Browns Bank.....	31	615	1,041,480	798,898	3,470	4,073,195	454,565	69,080	
Georges Bank.....	47	673	6,254	9,366,499	34,775	25,388,970	16,576,409	851,770	6,200
South Channel.....	39	187	4,361,864	9,366,499	34,775	25,388,970	16,576,409	851,770	6,200
Off Highland Light.....	1	7	965,170	845,275	5,330	7,693,865	2,215,950	503,010	8,900
Off Chatham.....	3	5	500	700		55,500	6,800	150	
Nantucket Shoals.....	10	38	9,175	10,720	1,000	204,150	28,975	11,900	
Shore, general.....	2	3	33,295	122,870		517,185	91,090	16,285	
Total.....	152	10,376	9,100,231	14,434,402	72,155	45,656,910	20,155,674	1,668,941	15,100
Other trawls, medium:									
Sable Island Bank (Western Bank).....	3	38	89,900	119,200		376,700	5,800	7,750	
Cape Shore.....	2	36	18,175	48,535		46,670	4,600	1,445	
La Have Bank.....	5	49	22,275	13,570		102,250	15,500	5,230	
Browns Bank.....	19	277	262,490	243,080		1,022,175	100,550	7,400	
Georges Bank.....	48	4,059	1,579,130	2,361,278	15,850	8,622,735	4,186,005	220,540	800
Clark Bank.....	2	15	2,280	2,450		37,100	16,200	3,930	
South Channel.....	41	2,561	670,693	1,082,645	4,850	7,197,650	2,228,910	348,045	9,720
Off Highland Light.....	6	50	8,320	12,000		67,370	25,100	6,000	
Off Chatham.....	17	60	129,200	166,840		789,760	142,140	127,465	
Nantucket Shoals.....	24	48	85,710	198,145		784,410	241,905	40,320	300
Middle Bank (Stellwagen Bank).....	2	26	8,855	4,840		23,830	1,680	28,740	
Shore, general.....	26	419	30,275	49,320	235	359,390	100,160	59,015	2,520
Total.....	169	8,361	2,907,303	4,301,853	20,935	19,520,040	7,068,595	855,880	13,340

<b>Offter trawls, small:</b>										
Georges Bank.....	3	30	256	68,420	46,005	357,420	82,815	2,335		
Clark Bank.....	1	1	5	800		11,500	600			
South Channel.....	3	20	158	20,640	54,085	331,485	45,505			
Off Highland Light.....	1	1	7	575	275	5,500	1,475			
Shore, general.....	47	435	1,153	97,170	93,866	618,171	30,175			32,548
<b>Total.....</b>	<b>148</b>	<b>487</b>	<b>1,579</b>	<b>187,605</b>	<b>195,821</b>	<b>1,324,076</b>	<b>160,650</b>	<b>97,709</b>		<b>32,548</b>
<b>Sink gill nets:</b>										
Jeffreys Ledge.....	5	50		82,135	6,378	13,791				13,145
Shore, general.....	40	3,892	3,916	4,740,189	322,638	2,114,710	345			856,619
<b>Total.....</b>	<b>140</b>	<b>3,951</b>	<b>3,975</b>	<b>4,822,324</b>	<b>329,016</b>	<b>2,128,501</b>	<b>345</b>	<b>859,764</b>		<b>236,610</b>
<b>Drift gill nets:</b>										
Bay of Islands.....	3	3	237							
Jeffreys Ledge.....	1	1	2							
Shore, general.....	63	492	975	82						
<b>Total.....</b>	<b>166</b>	<b>496</b>	<b>1,214</b>	<b>82</b>						
<b>Danish seines:</b>										
Nantucket Shoals.....	1	1	14							
Shore, general.....	1	5	31			1,440		1,070		
<b>Total.....</b>	<b>11</b>	<b>6</b>	<b>45</b>			<b>1,440</b>		<b>1,070</b>		
<b>Purse seines:</b>										
Cape Shore.....	15	16	99							
Georges Bank.....	6	8	50							
South Channel.....	22	23	122	140	75					
Off Chatham.....	1	1	3							
Nantucket Shoals.....	20	23	112							
Middle Bank (Stellwagen Bank).....	3	3	24							
South.....	39	53	198							
Shore, general.....	120	2,020	5,205	805	220	35				
<b>Total.....</b>	<b>1120</b>	<b>2,147</b>	<b>5,813</b>	<b>945</b>	<b>295</b>	<b>35</b>				
<b>Scallop drags:</b>										
Nantucket Shoals.....	1	1	7							
<b>Grand total.....</b>	<b>1372</b>	<b>11,112</b>	<b>48,729</b>	<b>30,193,109</b>	<b>30,175,180</b>	<b>92,178,669</b>	<b>27,938,205</b>	<b>6,874,073</b>		<b>876,351</b>

† Exclusive of duplication.

NOTE.—The 3 principal New England ports are Boston and Gloucester, Mass., and Portland, Maine. Otter trawls (including V-D trawls) are classified according to the size of the vessel. The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation. "Occasional" after the name of a bank or ground indicates that the vessel or vessels contributing to the catch as shown fished chiefly with another type of gear. In such cases the number of vessels fishing, number of trips, and number of days absent are shown under the principal types of gear used.

## Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

## BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Line trawls:									
Grand Bank	440	150	288,333						312,897
St. Peters Bank			76,837						76,837
Off Newfoundland									264,089
Seal Island Grounds									345,707
Gulf of St. Lawrence	5,000	36,975	3,207					5,825	1,274,516
Sectari Bank			26,352						142,437
Quereau Bank			60,312						142,437
The Gully		9,900	383,865	14,032				2,604	590,847
Sable Island Bank (Western Bank)			79,344						79,344
Cape Shore	15,280	146,600	233,511					3,350	2,619,672
Emerald Bank	62,305	357,340	8,069		434			21,545	3,731,621
La Have Bank	8,350	8,900	2,769					1,400	520,794
Roseway Bank	63,135	172,590	64,917					17,550	5,637,882
Browns Bank	970	13,350	198					107,267	162,938
Georges Bank	247,045	1,119,620	143,465	4,898				11,880	15,964,561
South Channel	233,355	1,317,317	566,016	3,590	15,917			11,880	9,937,509
Off Highland Light	275,475	134,580	18,396	13,870	526	2,000		26,115	9,159,832
Off Chatham	1,115	4,960	172						85,632
Nantucket Shoals	6,110	2,375	6,170	600				865	241,240
Cashes Bank	400	2,050	4,010					660	37,895
Flypines Bank	27,159	97,524	4,640					14,317	526,591
Platts Bank	21,023	63,865	996					2,970	500,506
Jennys Ledge	2,790	6,405	296					2,950	47,676
Thilles Bank	124,383	141,902	2,281	66				67,673	1,550,648
Middle Bank (Stellwagen Bank)	4,100	335	1,130	1,780				3,844	19,115
Shore, general	48,735	56,365	18,946	12,613				79,877	1,128,569
Total	1,219,782	2,856,429	1,994,347	51,449	20,556	2,000		368,392	57,267,269
Hand lines:									
Gulf of St. Lawrence (occasional)									
Cape Shore	12,350	4,400				14,985		5,185	14,985
Browns Bank	24,820	2,875	631					13,460	148,055
Georges Bank	94,921	3,500	4,011					7,443	333,809
Nantucket Shoals	5,040	1,100	2,216		135			2,255	1,070,466
Shore, general	591	650						75	255,921
Shore, general (occasional)	125								24,926
Total	137,838	12,625	6,858		2135	214,985		28,418	1,870,253



<b>Harpoons:</b>									
Grand Bank (occasional)								410	
Queauid Bank (occasional)								2,957	
Cape Shore								85,329	
La Have Bank (occasional)								307	
Browns Bank								327,284	
Browns Bank (occasional)								2,212	
Georges Bank								1,866,953	1,137
Georges Bank (occasional)								54,168	
South Channel (occasional)								1,233	
Nantucket Shoals								83,059	
Cashes Bank								11,526	
South								4,017	
Shore, general								128,020	
Shore, general (occasional)								2,188	
<b>Total</b>								2,569,753	1,137
<b>Other trawls, large:</b>									
St. Peters Bank				904				2,300	
Sable Island Bank (Western Bank)				49,469				283,055	
Cape Shore				5,852				13,810	
Emerald Bank				2,375				9,450	
La Have Bank				29,737				107,661	
Browns Bank				14,555				7,255,533	
Georges Bank				393,830				247,135	
Georges Bank (occasional)				10,380				330,729	
South Channel				106,935				173,205	
South Channel				1,436,083				13,516,480	
Off Highland Light				29,368				375	
Off Chatham				85				8,025	
Nantucket Shoals				1,299				2,485	
Shore, general				75				950	
<b>Total</b>				282,217				1,170,180	
<b>Other trawls, medium:</b>									
Sable Island Bank (Western Bank)				2,239				7,800	
Cape Shore				4,800				190	
La Have Bank				773				1,735	
Browns Bank				7,029				43,770	
Georges Bank				37,055				143,470	
Clark Bank				375				1,165	
South Channel				14,699				199,630	
Off Highland Light				154				12,866,880	
Off Chatham				966				159,044	
Nantucket Shoals				787				1,633,374	
Middle Bank (Stellwagen Bank)				80				1,573,822	
Shore, general				644				84,700	
<b>Total</b>				64,906				25,560	
				34,915				536,235	
				3,607,479				39,661,969	

<sup>2</sup> Incidental catch.

## Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

## BY GEAR AND FISHING GROUNDS—Continued

Gear and fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
Other trawls, small:									
Georges Bank	Pounds 2,040		Pounds 2,291	Pounds 181,275		Pounds	Pounds	Pounds	Pounds
Clark Bank								4,185	747,776
South Channel	170		5,650	600		150		2,865	14,880
Off Highland Light	550			2,450					530,970
Shore, general	2,745	361	720	1,086,064				28,034	14,725
Total	5,505	361	8,661	1,337,519		150		35,084	2,078,558
Sink gill nets:									3,386,909
Jeffreys Ledge									
Shore, general	38,160	673	14	250				8,249	176,445
Total	1,696,236	9,171	96	16,131				156,058	10,135,253
Drift gill nets:									
Bay of Islands									
Jeffreys Ledge									
Shore, general	1,734,396	9,844	110	16,381				164,307	10,311,698
Total									
Danish seines:									
Nantucket Shoals									
Shore, general									
Total									
Purse seines:									
Cape Shore									
Georges Bank									
South Channel									
Off Chatham									
Nantucket Shoals									
Middle Bank (Stellwagen Bank)									
South									
Shore, general	15,765								
Total	15,765								
Scallop drags:									
Nantucket Shoals									
Grand total	7,858,531	3,072,744	2,357,099	7,442,833	2,603,915	38,136,332	1,083,050	2,747,709	253,907,536

## SUMMARY: BY FISHING GROUNDS

Fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Off Newfoundland:										
Area XIX—	3	3	237	93,233	86,048	84,808				
Bay of Islands.....	1	1	19	20,269	2,228					
Off Newfoundland (Treaty Const)	3	8	197	16,200	54,700					
Area XX—	4	4	73				61,500		1,477	
Grand Bank.....										
St. Peters Bank.....										
Total.....	19	16	526	129,702	142,976	84,808	61,500		1,477	
Off Canada:										
Area XIX—	3	5	140	431,438	660,013	156,683				
Gulf of St. Lawrence										
Area XXI—	5	5	52	50,150	90,200		124,300	20,050	1,000	
Seal Island Grounds.....	3	3	43	67,206	14,829					
Quebec Bank.....	9	18	379	150,289	10,819		1,700		17,638	
The Gully.....	3	3	45							
Sable Island Bank (Western Bank)	59	125	1,563	2,750,367	3,063,341	13,480	7,040,945	446,380	146,325	
Cape Shore.....	62	122	1,390	691,598	1,152,605	2,960	1,646,455	188,230	301,955	
Emerald Bank.....	9	10	127	169,650	149,680		500,700	23,300	12,900	
La Have Bank.....	61	128	1,520	1,758,085	1,932,008	13,560	4,530,967	289,845	223,856	
Roseway Bank.....	3	3	33	44,910	66,240		33,690	500	2,700	
Brown's Bank.....	124	398	4,532	4,017,055	4,001,046	5,190	13,528,295	639,505	539,530	
Total.....	172	820	9,824	10,130,839	11,140,781	191,873	27,316,052	1,616,810	1,245,904	
Off United States:										
Area XXII—	191	1,572	16,282	10,402,543	13,832,287	53,305	37,272,175	20,928,649	1,384,705	7,000
Georges Bank.....	3	20	162	3,080	3,050		48,600	16,880	4,630	
Clark Bank.....	3	3	6,142	3,505,793	3,455,415	12,080	19,461,695	4,592,485	1,877,015	19,620
South Channel.....	138	760	104	14,895	15,410		183,770	34,355	25,120	
Off Highland Light.....	11	14	83	164,635	200,285	1,000	1,142,860	179,090	188,575	
Off Chatham.....	131	83	639	290,745	448,730	100	1,315,510	333,995	59,220	300
Nantucket Shoals.....	70	120	930	64,003	51,956	1,881	1,111,942	5,679	91,985	55,495
Cashes Bank.....	14	34	174	63,515	30,155		95,540	6,075	212,260	6,075
Fippennes Bank.....	12	23	118	4,760	2,720	625	10,920	1,290	3,170	12,480
Platts Bank.....	3	5	14	200,166	88,890	6,160	590,427	25,964	188,095	243,740
Jeffreys Ledge.....	30	248	512							

1 Exclusive of duplication.

## Landings by fishing vessels at the 3 principal New England ports, 1932—Continued

## SUMMARY: BY FISHING GROUNDS—Continued

Fishing grounds	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Off United States—Continued. Area XXII—Continued.	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
	2	2	6	530	350		8,550	150	4,800	
	22	77	308	83,685	44,800		584,715	18,445	352,925	
	250	7,281	12,838	5,175,218	717,345	17,904	3,974,113	178,308	1,204,182	531,641
	40	54	202							
Total	1 362	10,276	38,379	19,932,568	18,891,423	93,055	64,801,117	26,321,395	5,626,692	876,351
Grand total	1 372	11,112	48,729	30,193,109	30,175,180	369,736	92,178,669	27,938,205	6,874,073	876,351

  

Fishing grounds	Pollock	Cusk	Halibut	Flounders	Swordfish	Mackerel	Herring	Other	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Off Newfoundland:									
Area XIX—									
Bay of Islands									
Off Newfoundland (Treaty Coast)									
Area XX—									
Grand Bank	440	150	288,333		410				313,307
St. Peters Bank			77,741					2,300	212,441
Total	440	150	366,074		410		983,550	2,300	1,773,387
Off Canada:									
Area XIX—									
Gulf of St. Lawrence			26,382			14,985			1,289,501
Area XXI—									
Seal Island Grounds		36,975	3,207					5,825	345,707
Scatari Bank	5,000		60,312						142,437
Queveau Bank		9,900	383,865		2,957			2,604	593,804
The Gully			79,344	14,032					79,344
Sable Island Bank (Western Bank)	688,645	156,005	285,219	154,525				294,205	15,018,437
Cape Shore	82,455	367,735	9,396	78,100	85,763	617,115			5,165,177
Emerald Bank	16,400		5,144	3,210					10,900,734
La Have Bank	392,535	187,145	95,427	104,175	367				9,654,916

Roseway Bank.....	970	13,350	198						400	102,938
Browns Bank.....	745, 050	1,138,510	193,300			331,839			411,537	25,712,195
Total.....	1,901,055	1,918,520	1,141,704			420,926	632,100		893,277	59,045,211
Off United States:										
Area XXII—										
Georges Bank.....	2,604,332	435,702	735,426	3,696,534	1,046,323		94,970	3,500	498,844	43,896,285
Clark Bank.....	1,118,050	159,185	68,103	2,600					1,165	80,380
South Channel.....	13,135	4,960	325	1,426,907	3,737		163,235		401,815	36,265,135
Off Highland Light.....	86,220	2,625	7,221	32,850					375	325,196
Off Chatham.....	58,435	3,250	8,312	111,163			15,240		110,455	2,170,369
Nantucket Shoals.....	27,159	97,524	4,640	202,665	83,059		312,810		19,065	3,045,196
Cashes Bank.....	21,025	63,805	996		11,526				14,317	538,117
Frippies Bank.....	2,790	6,405	296						970	500,506
Platts Bank.....	162,543	142,575	2,295	316			65		2,250	47,676
Jeffreys Ledge.....	4,100	63,075	1,210						75,987	1,727,223
Tillies Bank.....	57,920	174,543	20,406	2,480			39,675		3,924	1,252,884
Middle Bank (Stellwagen Bank).....	1,800,952			1,452,038	133,887		34,537,181	96,000	722,965	50,796,743
Shore, general.....										
Area XXII—										
South.....					4,047		2,341,056			2,345,103
Total.....	5,957,036	1,154,074	849,231	6,927,553	2,182,579		37,504,232	99,500	1,852,132	193,068,938
Grand total.....	7,858,531	3,072,744	2,357,099	7,442,833	2,603,915		38,136,332	1,083,050	2,747,709	253,907,536

<sup>1</sup> Exclusive of duplication.

NOTE.—The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. The Roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

*Days' absence from port of fishing vessels landing fish at Boston and Gloucester, Mass., and Portland, Maine, 1932*

Fishing grounds	January	February	March	April	May	June	July
Off Newfoundland:							
Area XIX: Bay of Islands.....					130		
Area XX—							
Grand Bank.....					61		22
St. Peters Bank.....		68	5				
Total.....		68	5		191		22
Off Canada:							
Area XIX: Gulf of St. Lawrence.....					26	18	44
Area XXI—							
Seal Island Grounds.....						52	
Scatari Bank.....					19	24	
Quereau Bank.....		7	61	92	88	48	
The Gully.....				34	11		
Sable Island Bank (Western Bank).....	107	137	319	324	101	169	123
Cape Shore.....	76	29	29		48	112	9
Emerald Bank.....		36	45	22			
La Have Bank.....	306	379	128	79	74	109	96
Roseway Bank.....					26		
Browns Bank.....	689	512	557	770	479	148	252
Total.....	1, 178	1, 100	1, 139	1, 321	872	680	524
Off United States:							
Area XXII—							
Georges Bank.....	1, 041	1, 443	1, 096	449	1, 067	1, 699	2, 359
Clark Bank.....		10	10				
South Channel.....	204	569	673	513	330	574	398
Off Highland Light.....	13	14	32	4			
Off Chatham.....	28	48	143	61	56	30	14
Nantucket Shoals.....	127			34	111	166	92
Cashes Bank.....	21	6	6	27	26		
Fippenies Bank.....	35	27	8	3	7		
Platts Bank.....					2		
Jeffreys Ledge.....	130	66	21	6			
Tillies Bank.....	6						
Middle Bank (Stellwagen Bank).....	36	88	78	12	7	20	4
Shore, general.....	527	580	625	819	1, 017	1, 241	1, 433
Area XXIII: South.....					180	22	
Total.....	2, 168	2, 851	2, 692	1, 928	2, 803	3, 752	4, 300
Grand total.....	3, 346	4, 019	3, 836	3, 249	3, 566	4, 432	4, 846

*Days' absence from port of fishing vessels landing fish at Boston and Gloucester, Mass., and Portland, Maine, 1932—Continued*

Fishing grounds	August	September	October	November	December	Total
Off Newfoundland:						
Area XIX—						
Bay of Islands .....					107	237
Off Newfoundland (Treaty Coast) .....		19				19
Area XX—						
Grand Bank .....	35	24	26	29		197
St. Peters Bank .....						73
Total .....	35	43	26	29	107	526
Off Canada:						
Area XIX: Gulf of St. Lawrence .....		19	33			140
Area XXI—						
Seal Island Grounds .....						52
Scatari Bank .....						43
Quereau Bank .....	17	66				379
The Gully .....						45
Sable Island Bank (Western Bank) .....	23	56	27	13	164	1,563
Cape Shore .....	214	165	81	396	231	1,390
Emerald Bank .....				24		127
La Have Bank .....	30	44	31	35	209	1,520
Roseway Bank .....				7		33
Browns Bank .....	236	467	88	47	287	4,532
Total .....	520	817	260	522	891	9,824
Off United States:						
Area XXII—						
Georges Bank .....	2,349	1,776	1,252	1,145	606	16,282
Clark Bank .....						20
South Channel .....	583	595	653	438	612	6,142
Off Highland Light .....						41
Off Chatham .....	4	13	83	47	112	639
Nantucket Shoals .....	122	15	65	103	95	930
Cashes Bank .....	15	8	4	27	34	174
Fippenies Bank .....		5	5	12	16	118
Platts Bank .....			7	5		14
Jeffreys Ledge .....	4	4	66	114	101	512
Tillies Bank .....						6
Middle Bank (Stellwagen Bank) .....			21	60	72	398
Shore, general .....	1,644	1,597	1,529	1,034	792	12,838
Area XXIII: South .....						202
Total .....	4,721	4,013	3,685	2,985	2,481	38,379
Grand total .....	5,276	4,873	3,971	3,536	3,479	48,729

NOTE.—The roman numerals appearing in the stubs of the above tables refer to the numbers given these areas by the North American Council on Fishery Investigations.

#### MACKEREL FISHERY OF THE ATLANTIC COAST

That part of the 1932 mackerel catch taken by purse seines and drift gill nets and landed at the principal Atlantic receiving ports amounted to 46,770,749 pounds, an increase of 28 percent over the corresponding statistics for the previous year. The increase was caused by the extraordinarily large catches of young mackerel under 1 pound in weight, these blinks and tinkers accounting for more than 53 percent of the total.

Statistics on the catch by the Atlantic mackerel fleet are obtained by combining the figures of mackerel landed at Boston and Gloucester, Mass., and Portland, Maine, with those obtained by agents who in

recent years have been stationed at other Atlantic ports where mackerel are landed. The figures include only the catches made by purse-seine and drift-gill-net craft and in some cases the catch by craft of less than 5 net tons capacity is not included.

*Mackerel fishery of the Atlantic coast, 1932*

CATCH: BY AREAS IN 5-DAY PERIODS

Date	Southern (area XXIII)		Block Island (area XXII, west of Nantucket Shoals)		Gulf of Maine (area XXII, north of Nantucket Shoals)		Cape Shore (area XXI)	Total
	Seiners	Netters	Seiners	Netters	Seiners	Netters	Seiners	
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Apr. 16-20.....		250						250
Apr. 21-25.....	529,322	47,872						577,194
Apr. 26-30.....	501,595	8,588						510,183
May 1-5.....	1,523,031	74,274						1,597,305
May 6-10.....	2,863,220	29,900						2,893,120
May 11-15.....	245,700	692						246,392
May 16-20.....	499,660	247,462	183,134	6,240				936,496
May 21-25.....		115,325	985,185	66,270				1,166,780
May 26-31.....	1,130	1,390	900,785	11,530	2,410			917,245
June 1-5.....			1,035,628	22,500	880	2,000		1,061,008
June 6-10.....			741,493	18,000	11,615	17,625	306,925	1,095,658
June 11-15.....			1,303,930	15,500	5,714	12,174	293,950	1,631,268
June 16-20.....			317,335	3,130	39,712	1,000	167,540	528,717
June 21-25.....			696,265		148,450	2,260		846,975
June 26-30.....					551,012	1,535		552,547
July 1-5.....					411,450			411,450
July 6-10.....					485,770	250		486,020
July 11-15.....					1,191,395	40,620		1,232,015
July 16-20.....					1,210,890	63,840		1,274,730
July 21-25.....					350,973	39,470		390,443
July 26-31.....			18,715		1,305,265	39,325		1,363,305
Aug. 1-5.....					1,431,628	48,870		1,480,498
Aug. 6-10.....					1,399,377	11,550		1,410,927
Aug. 11-15.....					1,053,465	3,830		1,057,295
Aug. 16-20.....					546,572			546,572
Aug. 21-25.....					1,547,745	415		1,548,160
Aug. 26-31.....					1,154,075			1,154,075
Sept. 1-5.....					662,883	300		663,183
Sept. 6-10.....					855,867	1,170		857,037
Sept. 11-15.....					1,344,191	915		1,345,106
Sept. 16-20.....					1,768,913	1,900		1,770,873
Sept. 21-25.....					1,070,259			1,070,259
Sept. 26-30.....					3,313,720	8,155		3,321,875
Oct. 1-5.....					2,911,815	3,650		2,915,765
Oct. 6-10.....					1,326,965	450		1,327,415
Oct. 11-15.....					1,112,109	1,655		1,113,764
Oct. 16-20.....					396,250	1,011		397,261
Oct. 21-25.....					1,334,474	488		1,334,962
Oct. 26-31.....					929,700	4,042		933,742
Nov. 1-5.....					627,090	30,810		657,900
Nov. 6-10.....					237,680	26,705		264,385
Nov. 11-15.....					5,400	45,020		50,420
Nov. 16-20.....						278,499		278,499
Nov. 21-25.....					4,575	443,170		447,745
Nov. 26-30.....					55,150	220,630		275,780
Dec. 1-5.....						381,085		381,085
Dec. 6-10.....						385,535		385,535
Dec. 11-15.....						55,455		55,455
Dec. 21-25.....						5,975		5,975
Dec. 26-30.....						100		100
Total.....	6,163,658	525,753	6,182,470	143,170	30,865,439	2,181,844	768,415	46,770,749



*Mackerel fishery of the Atlantic coast, 1932—Continued*

## OPERATING UNITS AND CATCH: BY FLEET CLASSIFICATION AND GROUNDS

Designation	Vessels and boats	Ten- nage	Crew	Trips	Total catch
<b>SOUTHERN—AREA XXIII</b>					
<b>Seiners:</b>	<i>Number</i>	<i>Net tons</i>	<i>Number</i>	<i>Number</i>	<i>Pounds</i>
Regular vessels.....	41	1,703	557	226	4,803,803
Miscellaneous vessels.....	25	898	301	56	1,359,855
<b>Netters:</b>					
Regular vessels.....	13	272	93	91	396,496
Miscellaneous vessels.....	5	70	29	17	78,512
Miscellaneous boats.....	9			21	50,742
<b>Total.....</b>	<b>1 87</b>	<b>2,943</b>	<b>980</b>	<b>411</b>	<b>6,689,411</b>
<b>BLOCK ISLAND—AREA XXII</b>					
<b>(West of Nantucket Shoals only)</b>					
<b>Seiners:</b>					
Regular vessels.....	51	1,980	637	267	4,956,172
Miscellaneous vessels.....	34	1,092	389	81	1,196,298
<b>Netters:</b>					
Regular vessels.....	5	81	37	11	71,395
Miscellaneous vessels.....	10	152	67	10	63,285
Miscellaneous boats.....	2			3	8,490
<b>Total.....</b>	<b>1 100</b>	<b>3,305</b>	<b>1,130</b>	<b>372</b>	<b>6,325,640</b>
<b>GULF OF MAINE—AREA XXII</b>					
<b>(North of Nantucket Shoals only)</b>					
<b>Seiners:</b>					
Regular vessels.....	58	1,955	693	1,527	24,158,341
Miscellaneous vessels.....	51	1,374	498	586	6,484,505
Miscellaneous boats.....	5			25	162,593
<b>Netters:</b>					
Spring and summer:					
Miscellaneous vessels.....	19	311	135	128	142,554
Miscellaneous boats.....	38			173	160,765
<b>Fall:</b>					
Regular vessels.....	30	817	229	399	1,456,939
Miscellaneous vessels.....	22	617	160	142	410,120
Miscellaneous boats.....	7			19	11,466
<b>Total.....</b>	<b>1 141</b>	<b>5,074</b>	<b>1,715</b>	<b>2,969</b>	<b>32,987,283</b>
<b>CAPE SHORE—AREA XXI</b>					
<b>Seiners.....</b>	<b>19</b>	<b>872</b>	<b>242</b>	<b>20</b>	<b>768,415</b>
<b>Total seiners.....</b>	<b>1 114</b>			<b>2,788</b>	<b>43,919,982</b>
<b>Total netters.....</b>	<b>1 71</b>			<b>1,014</b>	<b>2,850,767</b>
<b>Grand total.....</b>	<b>1 150</b>			<b>3,802</b>	<b>46,770,749</b>

<sup>1</sup> Exclusive of duplication and of boats.<sup>2</sup> Of this total, 320,000 pounds were tacks (under ½ lb. each), 24,660,000 pounds were tinkers (½ to 1 pound each), and 21,790,000 pounds were of larger sizes (over 1 pound each). There were no bullseye mackerel landed by the fleet.

NOTE.—The Roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

## FISHERIES OF THE MIDDLE ATLANTIC STATES

(Area XXIII) <sup>4</sup>

The yield of the commercial fisheries in the Middle Atlantic States (New York, New Jersey, Pennsylvania, and Delaware) during 1932 amounted to 141,221,457 pounds, valued at \$4,653,979 to the fishermen, representing a decrease of 7 percent in volume and 36 percent in value as compared with the catch in the previous year. In addition, there was a production of 1,331,790 bushels of seed oysters, valued at \$481,013. These fisheries gave employment to 9,155 fishermen, including those in the fishery for seed oysters.

*Fisheries of the Middle Atlantic States, 1932*

## SUMMARY OF CATCH

Product	New York		New Jersey		Pennsylvania	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Fish.....	53,459,498	\$919,599	56,432,759	\$984,160	31,729	\$1,739
Shellfish, etc.....	11,406,724	1,413,748	16,161,565	1,233,675	-----	-----
Total.....	64,866,222	2,333,347	72,594,324	2,217,835	31,729	1,739

  

Product	Delaware		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Fish.....	2,377,901	\$32,713	112,301,887	\$1,938,211
Shellfish, etc.....	1,350,969	68,341	28,919,258	2,715,764
Total.....	3,728,870	101,054	141,221,145	4,653,975

## OPERATING UNITS: BY STATES

Item	New York	New Jersey	Pennsylvania	Delaware	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	937	1,853	-----	72	2,862
On boats and shore:					
Regular.....	1,106	974	-----	67	2,147
Casual.....	1,314	1,581	51	415	3,361
Total.....	3,357	4,408	51	554	8,370
<b>Vessels:</b>					
Steam.....	8	-----	-----	-----	8
Net tonnage.....	1,600	-----	-----	-----	1,600
Motor.....	176	217	-----	14	407
Net tonnage.....	2,910	3,485	-----	221	6,616
Total vessels.....	184	217	-----	14	415
Total net tonnage.....	4,510	3,485	-----	221	8,216
<b>Boats:</b>					
Motor.....	438	1,102	-----	53	1,593
Other.....	1,173	712	12	149	2,046
Accessory boats.....	48	-----	-----	-----	48

<sup>4</sup> This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there are included in this area craft owned in the area but at times fishing elsewhere. A notable example is the southern trawl fishery which extends into area XXIV. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

*Fisheries of the Middle Atlantic States, 1932—Continued*

## OPERATING UNITS: BY STATES—Continued

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Apparatus:					
Purse seines:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Menhaden.....	5	2			7
Length, yards.....	1,680	906			2,586
Other.....	2	13			15
Length, yards.....	800	4,960			5,760
Haul seines.....	131	127	13	60	331
Length, yards.....	13,544	12,690	1,735	18,425	46,394
Gill nets:					
Anchor.....	115	1			116
Square yards.....	72,827	900			73,727
Drift.....	391	801		52	1,244
Square yards.....	428,384	599,720		136,675	1,164,779
Runaround.....	35	84		19	138
Square yards.....	124,422	247,520		27,900	399,842
Stake.....	42	697		162	901
Square yards.....	15,102	92,620		12,890	120,612
Lines:					
Hand.....	187	854		37	1,078
Hooks.....	363	11,116		74	11,553
Trawl.....	747	863		21	1,571
Hooks.....	221,920	475,100		15,300	712,320
Troll.....	16				16
Hooks.....	16				16
Trot with baits or snoods.....	6	4			10
Baits or snoods.....	5,500	3,400			8,900
Trot with hooks.....	22				22
Hooks.....	3,095				3,095
Pound nets.....	308	163		55	526
Floating traps.....	5				5
Weirs.....		111			111
Stop nets.....	20	61		35	116
Square yards.....	9,004	63,600		7,984	80,588
Fyke nets.....	1,325	1,588		187	3,100
Dip nets.....	15	25		21	61
Cast nets.....		4		1	5
Scap nets.....	269				269
Drag nets.....	52	9			61
Yards at mouth.....	140	18			158
Otter trawls.....	120	59			179
Yards at mouth.....	2,605	1,315			3,920
Pots:					
Crab.....	40	10			50
Eel.....	3,290	3,062		643	6,995
Lobster.....	17,008	27,460		185	44,653
Harpoons.....	24				24
Spears.....	92	54		6	152
Dredges:					
Clam.....	14	56		20	90
Yards at mouth.....	12	60		19	91
Crab.....	6	49		12	67
Yards at mouth.....	5	62		18	85
Mussel.....	2				2
Yards at mouth.....	2				2
Oyster.....	91	247		22	360
Yards at mouth.....	131	294		28	453
Scallop.....	945	10			955
Yards at mouth.....	877	32			909
Tongs.....	508	868		64	1,440
Rakes.....	464	462			926
Forks.....	265	47			312
Hoes.....		135			135
Gaffs.....				1	1



Silversides.....	166,690	5,358	6,071	728	172,761	6,086	
Skates.....	15,855	188	62,950	400	78,805	588	
Smelts.....	250	30			250	30	
Snapper, red.....			6,250	400	6,250	400	
Spanish mackerel.....			7,983	670	7,983	670	
Spot.....	27,157	457	107,156	1,913	19,560	689	
Squeteague or "sea trout", gray.....	677,057	32,720	8,301,547	172,652	105,959	3,059	
Striped bass.....	31,590	4,538	11,543	2,205	8,444	1,223	
Sturgeon.....	2,982	548	6,510	760	1,600	304	
Suckers.....	33,915	2,500	69,150	3,808	940	11,092	
Sunfish.....	1,808	169				1,808	
Swordfish.....	69,906	8,291	29,656	858		69,906	
Tautog.....	70,753	2,446	67,755	768		161,409	
Thimble-eyed mackerel.....						67,755	
Tilfish.....	1,870,119	50,455				1,870,119	
Tomcod.....	23,820	695	250	3		24,070	
Tuna or "horse mackerel".....	2,950	89	56,518	2,527		59,408	
Whitebait.....	6,760	893				6,760	
White perch.....	10,250	990	215,225	11,389		253,280	
Whiting.....	171,002	1,224	2,533,847	29,669		2,704,849	
Wolffish.....	25,247	291				25,247	
Yellow perch.....	3,275	400	5,900	233		14,765	
Total.....	53,459,498	919,599	56,432,759	984,160	31,729	1,938,211	
SHELLFISH, ETC.							
Crabs:							
Hard.....	181,688	2,121	254,274	16,966		776,587	24,024
King.....			3,006,417	6,375		3,501,217	7,090
Soft.....	2,381	771	59,314	6,998		715	11,283
Lobsters.....	397,081	70,157	470,130	92,755		878,261	165,675
Shrimp.....	111,950	24,284	5,800	2,650		117,250	26,934
Squid.....	824,879	10,799	1,375,591	23,580		2,200,470	34,329
Clams:							
Hard, public <sup>1</sup> .....	771,664	123,632	1,258,928	183,900		2,060,092	314,207
Hard, private <sup>1</sup> .....	113,680	23,081	97,242	17,084		210,922	40,135
Soft, public <sup>2</sup> .....	518,272	35,306	668,240	25,965		1,186,512	61,271
Soft, private <sup>2</sup> .....	9,200	900				9,200	900
Surf or skimmers.....	352,656	18,440	136,250	6,175		488,906	24,615
Conchs.....	38,520	3,080				38,520	3,080
Mussels.....	86,000	5,560	4,000	200		113,400	8,010
Oysters: <sup>4</sup>							
Market, public, spring.....	103,010	13,519	16,585	2,007		119,595	15,526
Market, public, fall.....	11,900	1,229	50,971	4,590		184,171	21,699
Market, private, spring.....	2,689,688	398,225	158,118	22,565		2,847,806	420,790
Market, private, fall.....	3,231,655	481,448	8,337,955	792,521		11,875,904	1,305,491
Periwinkles.....			630	18		630	18

<sup>1</sup> Statistics on hard clams, public, are based on yields of 8 pounds of meats to the bushel in New York, 8.89 pounds in New Jersey, and 10 pounds in Delaware.

<sup>2</sup> Statistics on hard clams, private, are based on yields of 8 pounds of meats to the bushel in New York and 9.34 pounds in New Jersey.

<sup>3</sup> Statistics on soft clams used in this table are based on yields of 10 pounds of meats to the bushel in New York and 20 pounds in New Jersey.

<sup>4</sup> Statistics on oysters used in this table are based on yields of 7 pounds of meats to the bushel in New York, 8.98 in New Jersey, and 6.15 pounds in Delaware.

*Fisheries of the Middle Atlantic States, 1932—Continued*

CATCH: BY STATES—Continued

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Scallops:	393,040	\$41,811							393,040	\$41,811
Bay.....	1,531,587	125,749							1,771,821	139,779
Sea.....			240,234	\$14,030					515	180
Terrapin, diamond-back.....			515	180						
Turtles:										
Hawksbill.....			3,650	76					3,650	76
Loggerhead.....			1,550	5					1,550	5
Snapper.....			1,600	160					3,200	245
Bloodworms.....	28,981	27,366	3,505	3,774		\$85	1,600		32,486	31,140
Sandworms.....	8,892	6,270	10,566	11,181					19,458	17,451
Total.....	11,406,724	1,413,748	16,161,565	1,293,675			1,350,969	68,341	28,919,258	2,715,764
Grand total.....	64,866,222	2,333,347	72,594,324	2,217,835	31,729	\$1,739	3,728,870	101,054	141,221,145	4,653,975

NOTE.—Of the total catch in New Jersey there were 7,000 pounds of shad, valued at \$560, caught in the St. Johns River in Florida. There were also, 1,081,294 pounds of fishery products, valued at \$45,302, taken in the southern trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in New York, there were 738,541 pounds of fishery products, valued at \$26,853, taken in the same fishery. These products consisted principally of croaker, flounders, scup, sea bass, and gray squeteague.

*Fisheries of the Middle Atlantic States, 1932—Continued*

## PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHEL

Product	New York		New Jersey		Delaware		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:								
Hard.....number.....	545,064	\$2,121	762,822	\$16,966	1,021,875	\$4,937	2,329,761	\$24,024
King.....do.....			801,711	6,375	131,947	715	933,658	7,090
Soft.....do.....	9,524	771	177,942	6,998	70,200	3,514	257,666	11,283
Clams:								
Hard, public.....bushels.....	96,458	123,632	141,612	183,900	2,950	6,675	241,020	314,207
Hard, private.....do.....	14,210	23,081	10,411	17,054			24,621	40,135
Soft, public.....do.....	32,392	35,306	33,412	25,965			65,804	61,271
Soft, private.....do.....		575					575	900
Surf or skimmer.....do.....	29,388	18,440	10,900	6,175			40,288	24,615
Conchs.....do.....	2,140	3,080					2,140	3,080
Mussels, sea.....do.....	8,600	5,560	400	200	1,800	2,250	10,800	8,010
Oysters:								
Market, public, spring.....do.....	14,716	13,519	1,847	2,007			16,563	15,526
Market, public, fall.....do.....	1,700	1,229	5,676	4,590	19,561	15,880	26,937	21,699
Market, private, spring.....do.....	384,241	398,225	17,608	22,565			401,849	420,790
Market, private, fall.....do.....	461,665	481,448	928,503	792,521	49,804	31,522	1,439,972	1,305,491
Scallops:								
Bay.....do.....	78,608	41,811					78,608	41,811
Sea.....do.....	255,264	125,749	40,039	14,030			295,303	139,779

## SEED OYSTER FISHERY

Item	New York		New Jersey		Delaware		Total	
OPERATING UNITS								
Fishermen:	Number		Number		Number		Number	
On vessels.....	26		1,645		71		1,742	
On boats and shore:								
Regular.....	278		83		29		390	
Casual.....	6		139		45		190	
Total.....	310		1,867		145		2,322	
Vessels:								
Motor.....	8				11		19	
Net tonnage.....	74				152		226	
Sail.....			150		2		152	
Net tonnage.....			3,011		25		3,036	
Total vessels.....	8		150		13		171	
Total net tonnage.....	74		3,011		177		3,262	
Boats:								
Motor.....	161		104		8		273	
Other.....	9		104		63		176	
Apparatus:								
Dredges.....	6		300		28		334	
Yards at mouth.....	8		356		33		397	
Tongs.....	286		181		70		537	
Rakes.....	9		40		1		50	
CATCH								
Oysters:	Bushels	Value	Bushels	Value	Bushels	Value	Bushels	Value
Seed, public, spring.....	33,884	\$20,240	1,111,337	\$380,826	105,470	\$24,488	1,250,691	\$425,554
Seed, public, fall.....	5,621	3,283	27,000	6,788	2,400	590	35,021	10,661
Seed, private, spring.....	21,113	19,833					21,113	19,833
Seed, private, fall.....	24,965	24,965					24,965	24,965
Total.....	85,583	68,321	1,138,337	387,614	107,870	25,078	1,331,790	481,013

NOTE.—Of the number of persons fishing for seed oysters, 298 in New York, 1,146 in New Jersey, and 93 in Delaware—a total of 1,537 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 6 vessels, all the boats, 2 dredges, and all tongs and rakes in New York; 81 vessels, 99 motor boats, 100 other boats, 162 dredges, 178 tongs and 38 rakes in New Jersey; and 6 vessels, 2 motor boats, 56 other boats, 12 dredges, and 63 tongs in Delaware—a total of 93 vessels, 262 motor boats, 165 other boats, 176 dredges, 527 tongs and 47 rakes.

## NEW YORK

*Fisheries of New York, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets				Lines				
	Menhaden	Other		Anchor	Drift	Runaround	Stake	Hand	Trawl	Troll	Trot with baits or snoods	Trot with hooks
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels	89	17	2	8	17	17		43	94			
On boats and shore:												
Regular			109	42	63	50	12	50	90	6	6	1
Casual			168	20	159	1	47	10	17	2	2	21
Total	89	17	279	70	239	68	59	103	201	8	8	22
Vessels:												
Steam												
Net tonnage												
Motor	5	2	1	4	2	6		7	14			
Net tonnage	114	41	8	28	83	62		143	270			
Total vessels	5	2	1	4	2	6		7	14			
Total net tonnage	114	41	8	28	83	62		143	270			
Boats:												
Motor			3	12	25	1	41	42	4	6		
Other			117	32	111	2	38	5	11			22
Accessory boats	14			2			1	31				
Apparatus:												
Number	5	2	131	115	391	35	42	187	747	16	6	22
Length, yards	1,680	800	13,544									
Square yards				72,827	428,384	124,422	15,102					
Yards at mouth												
Hooks, baits, or snoods								363	221,920	16	5,500	3,095

Item	Pound nets	Floating traps	Stop nets	Fyke nets	Dip nets	Scap nets	Drag nets	Other trawls	Pots			Harpoons
									Crab	Eel	Lobster	
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels	3			6				354			9	35
On boats and shore:												
Regular	125	10	5	49	11	5	22	66	4	63	167	34
Casual	7		24	52	4	263	30	11		41	33	2
Total	135	10	29	107	15	268	52	431	4	104	209	71
Vessels:												
Steam								8				
Net tonnage								1,600				
Motor	1			3				62			6	7
Net tonnage	10			22				955			40	146
Total vessels	1			3				70			6	7
Total net tonnage	10			22				2,555			40	146
Boats:												
Motor	35			15			2	50	2	28	127	17
Other	103	5	19	74	15	191		1		62	8	
Accessory boats												2
Apparatus:												
Number	308	5	20	1,325	15	269	52	120	40	3,290	17,008	24
Square yards			9,004									
Yards at mouth							140	2,605				



## Fisheries of New York, 1932—Continued

## OPERATING UNITS: BY GEAR—Continued

Item	Spears	Dredges					Tongs	Rakes	Forks	By hand	Total exclusive of duplication
		Clam	Crab	Mussel	Oyster	Scallop					
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	10	2	2	193	155	47					937
On boats and shore:											
Regular.....	48	11			6	130	304	192	165		1,106
Casual.....	44	3				189	156	267	132		1,314
Total.....	92	24	2	2	199	474	507	459	297	1	3,357
Vessels:											
Steam.....											8
Net tonnage.....											1,600
Motor.....		5	1	1	43	30	22				176
Net tonnage.....		45	6	13	946	483	137				2,910
Total vessels.....		5	1	1	43	30	22				184
Total net tonnage.....		43	6	13	946	483	137				4,510
Boats:											
Motor.....		9			3	70	118	70			438
Other.....	82					162	265	352	14	1	1,173
Accessory boats.....											48
Apparatus:											
Number.....	92	14	6	2	91	945	508	464	265		
Yards at mouth.....		12	5	2	131	877					

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Menhaden		Other				Anchor	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives.....					213,120	\$2,109		
Bluefish.....			23,100	\$1,314	12,858	541	82,886	\$5,135
Bonito.....					170	17		
Butterfish.....					25	4		
Carp.....					54,945	4,989	5,075	505
Catfish and bullheads.....					4,505	747		
Eels.....					13,380	1,470		
Flounders.....					4,000	160		
King whiting or "kingfish".....					11,433	571		
Launce.....					1,000	17		
Mackerel.....					3,750	187		
Menhaden.....	25,245,600	\$42,076						
Mummichog.....					44,530	2,856		
Scup or porgy.....			383,700	7,674	1,225	12		
Sea bass.....			5,500	220				
Shad.....					1,350	150		
Silversides.....					166,470	5,331		
Squeteagues or "sea trout", gray.....			125,100	3,773	99,157	3,457	95,256	4,705
Striped bass.....					5,785	954	215	44
Sturgeon.....					190	16	310	60
Sucker.....					10,030	668	200	30
Sunfish.....					300	28		
Tomcod.....					500	25		
Whitebait.....					6,760	893		
White perch.....					1,800	155	2,150	192
Yellow perch.....					645	73	550	55
Shrimp.....					41,250	8,192		
Squid.....					7,500	38		
Total.....	25,245,600	42,076	537,400	12,981	706,678	33,660	186,636	10,726

*Fisheries of New York, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Gill nets—Continued						Lines	
	Drift		Runaround		Stake		Hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	11,750	\$378			5,845	\$122		
Bluefish.....			218,400	\$10,127	500	25	530,770	\$29,796
Bonito.....			8,000	240				
Butterfish.....			11,000	255	300	12		
Carp.....	1,225	106			770	72		
Catfish and bullheads.....	20	3						
Cod.....							139,620	2,687
Eels.....					260	39		
Flounders.....							32,300	646
Haddock.....							1,200	24
Herring, sea.....			500	15				
King whiting or "kingfish".....			310	31			25	2
Mackerel.....	152,955	2,293	62,400	4,368			2,150	108
Pike or pickerel.....					400	40		
Pollock.....							201,000	3,015
Scup or porgy.....							31,785	632
Sea bass.....							92,400	4,699
Shad.....	344,597	33,468			51,560	7,367		
Squeteagues or "sea trout", gray.....			41,105	2,514	7,900	547	5,175	297
Striped bass.....	1,540	258	8,250	1,070	1,910	389		
Sturgeon.....	1,000	197			200	39		
Suckers.....					1,900	150		
Tautog.....					300	9	23,650	716
White perch.....	500	25			2,175	195		
Total.....	513,587	36,728	349,965	18,620	74,020	9,006	1,060,076	42,622

Species	Lines—Continued							
	Trawl		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			9,200	\$460				
Carp.....							1,905	\$194
Catfish and bullheads.....							240	42
Cod.....	735,070	\$17,942						
Eels.....	6,015	112					1,400	216
Grayfish.....	800	8						
Haddock.....	33,040	896						
Hake.....	2,613	59						
Pollock.....	300	8						
Skates.....	8,960	127						
Squeteagues or "sea trout", gray.....	72,351	3,857						
Suckers.....							250	35
Tilefish.....	1,870,119	50,455						
White perch.....							120	12
Crabs, hard.....					25,190	\$229		
Total.....	2,729,268	73,464	9,200	460	25,190	229	4,015	499

Species	Pound nets		Floating traps		Stop nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Albacore.....	8,200	\$226						
Alewives.....					790	\$20	127,750	\$1,316
Bluefish.....	35,455	1,669						
Bonito.....	46,033	1,271						
Butterfish.....	1,216,373	33,835	9,864	\$183				
Carp.....					37,883	3,457	9,325	688
Catfish and bullheads.....					475	72	7,300	1,126
Cod.....	2,210	47						
Eels.....	115,192	14,475					8,950	851
Flounders.....	168,517	7,954	127,152	3,726			776,985	8,619
Hake.....			1,235	12				
Herring, sea.....	23,221	329						
King whiting or "kingfish".....	51,797	3,698						
Launce.....	36,118	451						
Mackerel.....	151,181	8,171	740	27				
Menhaden.....	247,454	1,243						

*Fisheries of New York, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Pound nets		Floating traps		Stop nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Mullet.....	91	4					2,050	100
Pike or pickerel.....							180	28
Pollock.....			1,471	16				
Scup or porgy.....	463,431	8,535	37,821	378				
Sea bass.....	15,330	845	19,568	587				
Sea robin.....	13,283	261	1,450	5				
Shad.....	2,988	259			100	15		
Sharks.....			250	2				
Skates.....			2,840	21				
Spot.....	27,157	457						
Squeteagues or "sea trout", gray.....	223,977	13,349						
Striped bass.....	13,485	1,759			280	60	125	24
Sturgeon.....			119	12	150	45	300	30
Suckers.....					760	55	12,538	923
Sunfish.....					180	12	1,060	103
Tautog.....	42,111	1,512	77	2			4,530	206
Tomcod.....							23,320	670
Tuna or "horse mackerel".....	2,950	89						
White perch.....					175	17	2,325	296
Whiting.....	167,727	1,207	3,275	17				
Yellow perch.....							1,755	239
Crabs, hard.....	60,000	600					41,500	445
Squid.....	789,768	10,355	26,200	391				
Total.....	3,923,959	112,601	232,062	5,379	40,793	3,753	1,020,013	15,664

Species	Dip nets		Scap nets		Drag nets		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			87,228	\$2,414				
Bluefish.....							259	24
Butterfish.....							1,658	55
Carp.....			50,038	4,372				
Catfish and bullheads.....			2,812	377				
Cod.....							2,460,470	64,852
Croaker.....							66,830	1,393
Cusk.....							134,643	1,555
Drum, black.....							118	1
Eels.....			280	40			1,761	39
Flounders.....							5,900,633	177,626
Haddock.....							7,578,665	205,921
Hake.....							143,191	3,329
Halibut.....							45,181	6,496
Hogfish.....							537	8
King whiting or "kingfish".....							1,414	35
Pike or pickerel.....			75	8				
Pollock.....							457,596	7,955
Rosefish.....							7,426	96
Scup or porgy.....			390	19			155,810	3,725
Sea bass.....							276,522	9,920
Skates.....							4,055	40
Smelt.....			250	30				
Squeteagues or "sea trout", gray.....							7,036	221
Sturgeon.....			550	125			163	24
Suckers.....			8,137	699				
Sunfish.....			308	26				
Tautog.....							85	1
White perch.....			1,005	98				
Wolfish.....							25,247	291
Yellow perch.....			125	13				
Crabs:								
Hard.....	5,620	\$110			40,000	\$400		
Soft.....	2,381	771						
Lobsters.....							105	13
Shrimp.....					70,700	16,092		
Scallops, sea.....							27	2
Squid.....							1,411	15
Total.....	8,001	881	151,198	8,221	110,700	16,492	17,270,843	483,637

*Fisheries of New York, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Crab		Eel		Lobster			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....			75	7				
Catfish and bullheads.....			50	6				
Eels.....			154, 015	12, 322				
Pike or pickerel.....			44, 940	1, 524				
Sea robin.....					70, 000	\$4, 200		
Skates.....			220	27				
Tautog.....							69, 906	\$8, 291
Yellow perch.....			200	20				
Crabs, hard.....	3, 650	\$233			3, 728	74		
Lobsters.....					396, 976	70, 144		
Conchs.....			14, 400	400				
Total.....	3, 650	233	213, 900	14, 306	470, 704	74, 418	69, 906	8, 291

Species	Spears		Dredges					
			Clam		Crab		Mussel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels.....	32, 540	\$3, 156						
Crabs, hard.....					2, 000	\$30		
Clams, surf or skimmer.....			309, 876	\$13, 762				
Mussels, sea.....							80, 000	\$5, 200
Total.....	32, 540	3, 156	309, 876	13, 762	2, 000	30	80, 000	5, 200

Species	Dredges—Continued				Tongs	
	Oyster		Scallop			
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Clams:						
Hard, public					564, 688	\$91, 026
Hard, private	43, 120	\$6, 160			68, 760	16, 536
Soft, public					1, 920	240
Surf or skimmer					42, 780	4, 678
Conchs			24, 120	\$2, 680		
Oysters:						
Market, public, spring	85, 687	12, 226			10, 673	1, 091
Market, public, fall	700	80			9, 520	1, 005
Market, private, spring	2, 675, 478	395, 617			12, 950	2, 500
Market, private, fall	3, 216, 465	478, 666			13, 650	2, 650
Scallops:						
Bay			393, 040	41, 811		
Sea			1, 531, 560	125, 747		
Total	6, 021, 450	892, 749	1, 948, 720	170, 238	724, 941	119, 726

Species	Rakes		Forks		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Hard, public.....	204, 976	\$32, 356	2, 000	\$250		
Hard, private.....	1, 800	385				
Soft, public.....	109, 120	8, 308	407, 233	26, 758		
Soft, private.....			9, 200	900		
Mussels, sea.....			6, 000	360		
Oysters:						
Market, public, spring.....	6, 510	187			140	\$15
Market, public, fall.....	1, 680	144				
Market, private, spring.....	1, 260	108				
Market, private, fall.....	1, 540	132				
Bloodworms.....			28, 981	27, 366		
Bandworms.....			8, 892	6, 270		
Total.....	326, 886	41, 620	462, 305	61, 904	140	15

*Fisheries of New York, 1932—Continued*

## SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
<b>Fishermen:</b>	<i>Number</i>		<i>Number</i>		<i>Number</i>		<i>Number</i>	
On vessels.....	15		11				26	
On boats and shore:								
Regular.....			270		8		278	
Casual.....			5		1		6	
Total.....	15		286		9		310	
<b>Vessels:</b>								
Motor.....	3		5				8	
Net tonnage.....	45		29				74	
<b>Boats:</b>								
Motor.....			158		3		161	
Other.....			3		6		9	
<b>Apparatus:</b>								
Number.....	6		286		9		301	
Yards at mouth.....	8						8	
<b>CATCH</b>								
<b>Oysters:</b>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>
Seed, public, spring.....			33,434	\$20,060	450	\$180	33,884	\$20,240
Seed, public, fall.....			5,171	3,103	450	180	5,621	3,283
Seed, private, spring.....	21,113	\$19,833					21,113	19,833
Seed, private, fall.....	24,965	24,965					24,965	24,965
Total.....	46,078	44,798	38,605	23,163	900	360	85,583	68,321

NOTE.—Of the number of persons fishing for seed oysters, all of those in the tong and rake fisheries, and 3 in the dredge fishery are duplicated among those in the market oyster fishery or fisheries for other species. Similarly, all the craft and gear in the tong and rake fishery are duplicated as well as 1 motor vessel, and 2 dredges in the dredge fishery.

## NEW JERSEY

*Fisheries of New Jersey, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets				Lines		
	Menhaden	Other		Anchor	Drift	Runaround	Stake	Hand	Trawl	Trot with baits or snoods
<b>Fishermen:</b>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
On vessels.....	42	114			8			99	62	
On boats and shore:										
Regular.....			83		96	54	31	184	246	3
Casual.....			225	2	168	60	66	156	66	4
Total.....	42	114	308	2	272	114	97	439	374	7
<b>Vessels:</b>										
Motor.....	2	13			1			18	16	
Net tonnage.....	123	195			11			220	178	
<b>Boats:</b>										
Motor.....			22	1	106	57	39	206	145	3
Other.....			95		30		7	6	1	
Accessory boats.....		17	1					39	21	
<b>Apparatus:</b>										
Number.....	2	13	127	1	801	84	697	854	803	4
Length, yards.....	906	4,960	12,690							
Square yards.....				900	599,720	247,520	92,620			
Hooks, baits, or snoods.....								1,116	475,100	3,400

*Fisheries of New Jersey, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Pound nets	Wairs	Stop nets	Fykes	Dip nets	Cast nets	Drag nets	Otter trawls	Pots		
									Crab	Eel	Lobster
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	249							142			
On boats and shore:											
Regular.....	115		21	53	6		4	53	1	32	176
Casual.....	6	24	60	83	19	4	7	10		63	56
Total.....	370	24	81	136	25	4	11	205	1	95	232
Vessels:											
Motor.....	38							30			
Net tonnage.....	230							637			
Boats:											
Motor.....	22	8	15	37	8		7	29		44	132
Other.....	7	5	34	46	15				1	25	
Apparatus:											
Number.....	163	111	61	1,588	25	4	9	59	10	3,062	27,460
Square yards.....			63,600								
Yards at mouth.....								1,315			

  

Item	Spears	Dredges				Tongs	Rakes	Forks	Hoes	By hand	Total, exclusive of duplication
		Clam	Crab	Oyster	Scallop						
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....		174	16	1,217	37						1,853
On boats and shore:											
Regular.....	35	12	1	18		296	161	15	48	29	974
Casual.....	19		4	13		572	301	32	87	91	1,581
Total.....	54	186	21	1,248	37	868	462	47	135	120	4,408
Vessels:											
Motor.....		22	7	105	5						217
Net tonnage.....		332	67	2,073	74						3,485
Boats:											
Motor.....	9	6	3	19		428	229		21	25	1,102
Other.....	43					371	204		59	68	712
Accessory boats.....						8					86
Apparatus:											
Number.....	54	56	49	247	10	868	462	47	135		
Yards at mouth.....		60	62	294	32						

## Fisheries of New Jersey, 1932—Continued

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Menhaden		Other					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....					77,795	\$882		
Bluefish.....			207,724	\$8,949	4,200	352	2,000	\$40
Bonito.....			1,310	42				
Butterfish.....			494	20				
Carp.....					49,690	5,391		
Catfish and bullheads.....					23,888	1,253		
Croaker.....			62,236	499	2,600	82		
Eels.....					46,049	3,665		
Flounders.....			12,618	254	29,565	1,745		
King whiting or "kingfish".....					1,550	107		
Menhaden.....	12,945,708	\$19,438	2,842,170	4,423				
Minnows.....					3,450	345		
Mullet.....					28,371	1,750		
Mummichog.....					7,655	980		
Scup or porgy.....			1,440,920	5,488				
Sea bass.....			31,419	880				
Shad.....					9,006	2,031		
Silversides.....					6,071	728		
Spot.....					150	8		
Squeteagues or "sea trout", gray.....			1,807,701	16,168	44,313	2,474	700	49
Striped bass.....					1,050	188		
Suckers.....					69,050	3,798		
Thimble-eyed mackerel.....			810	8				
Tuna or "horse mackerel".....			40,000	1,000				
White perch.....					10,865	832		
Yellow perch.....					250	10		
Crabs:								
Hard.....					240	15		
Soft.....					23,194	3,303		
Total.....	12,945,708	19,438	6,447,402	37,731	439,002	29,939	2,700	89

Species	Gill nets—Continued						Lines	
	Drift		Runaround		Stake		Hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....					5,520	\$181		
Bluefish.....	51,875	\$2,402	272,412	\$8,382	13,312	827	2,745,483	\$75,496
Bonito.....	1,000	20					108,406	3,270
Butterfish.....	25	3	19	2				
Cod.....							9,617	167
Croaker.....	34,100	604			1,000	90	6,485	156
Eels.....							11,697	1,221
Flounders.....							23,357	908
Mackerel.....	176,375	5,481						
Menhaden.....			400	4				
Scup or porgy.....			231	2			28,301	597
Sea bass.....							313,713	10,364
Shad.....	44,702	6,200			115,733	7,600		
Sharks.....							2,000	30
Snapper, red.....							6,250	400
Spanish mackerel.....							1,250	20
Spot.....	200	4						
Squeteagues or "sea trout", gray.....	90,650	3,048	98,549	3,173	18,244	1,070	58,375	2,511
Striped bass.....					4,180	866	400	48
Sturgeon.....	573	45					3,700	197
Tautog.....							56	2
Tuna or "horse mackerel".....							100	4
White perch.....					34,650	2,876	100	4
Yellow perch.....							100	4
Crabs:								
Hard.....	800	50			360	41		
Soft.....					340	55		
Total.....	400,300	17,857	371,611	11,563	193,339	13,606	3,319,290	95,395

*Fisheries of New Jersey, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines—Continued				Pound nets		Weirs	
	Trawl		Trot with baits or snoods					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Albacore					9,869	\$99		
Bluefish					541,252	16,168		
Bonito					871,263	22,544		
Butterfish					2,585,526	166,888		
Cod	3,827,022	\$83,003			164,359	4,160		
Croaker					306,073	6,529		
Drum, red or redfish					48,200	1,007		
Eels					10,440	1,244		
Flounders	7,000	255			293,991	13,058		
Frigate mackerel					2,750	34		
Goosefish					2,667	20		
Grayfish					7,340	73		
Hake	24,500	704			120,340	1,081		
Herring, sea					615,284	3,671		
King whiting or "kingfish"					96,366	5,017		
Mackerel					190,646	6,585		
Menhaden					1,912,755	5,856		
Pilotfish					1,200	35		
Pollock					1,362	43		
Pompano					200	10		
Scup or porgy					3,482,395	28,409		
Sea bass					261,045	8,334		
Sea robin					16,828	168		
Shad					54,231	7,662		
Sharks					19,138	200		
Skates	800	4			62,150	396		
Spanish mackerel					6,733	650		
Spot					105,189	1,874		
Squeteagues or "sea trout", gray					6,025,103	139,194		
Striped bass					1,115	164		
Sturgeon					876	200		
Tautog					16,028	414		
Thimble-eyed mackerel					66,945	760		
Tomcod					250	3		
Tuna or "horse mackerel"					16,462	1,525		
White perch					360	22		
Whiting					2,533,727	29,668		
Crabs:								
Hard			24,000	\$1,000	7,713	48		
King					1,517,250	3,209	1,437,000	\$2,926
Soft			10,720	285				
Squid					1,370,196	23,396		
Turtles:								
Hawksbill					3,650	76		
Loggerhead					1,550	5		
Total	3,859,322	\$3,966	34,720	1,285	23,350,817	440,499	1,437,000	2,926

Species	Stop nets		Fyke nets		Dip nets		Cast nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives			19,912	\$119				
Carp	84,800	\$9,325					2,000	\$220
Catfish and bullheads			16,402	1,182				
Eels			28,212	2,689				
Flounders			117,065	3,426				
Shad	262	63						
Striped bass	250	30	4,548	909				
Suckers			100	10				
White perch			169,250	7,655				
Yellow perch			5,550	219				
Crabs:								
Hard					12,300	\$721		
King			14,667	160				
Soft					14,620	2,554		
Turtles, snapper			1,600	160				
Total	85,312	9,418	377,306	16,529	26,920	3,275	2,000	220



## Fisheries of New Jersey, 1932—Continued

## CATCH: BY GEAR—Continued

Species	Drag nets		Otter trawls		Pots			
					Crab		Eel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			5,336	\$367				
Butterfish.....			36,822	1,293				
Cod.....			114,031	1,795				
Croaker.....			311,648	10,190				
Eels.....			3,823	77			142,190	\$12,996
Flounders.....			2,871,177	91,602				
Hake.....			11,200	219				
King whiting or "kingfish".....			14,851	484				
Mummichog.....							13,250	1,369
Scup or porgy.....			1,484,250	31,940				
Sea bass.....			820,069	25,820				
Spot.....			1,617	27				
Squeteagues or "sea trout," gray.....			160,912	4,965				
Sturgeon.....			5,061	515				
Tautog.....			2,213	47				
Whiting.....			120	1				
Crabs:								
Hard.....					8,000	\$400		
Soft.....					3,200	600		
Lobsters.....			465	70				
Shrimp.....	5,300	\$2,650						
Periwinkles.....			630	18				
Squid.....			5,395	134				
Total.....	5,300	2,650	5,849,620	169,564	11,200	1,000	155,440	14,365

Species	Pots—Continued		Spears		Dredges			
	Lobster				Clam		Crab	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Eels.....	10	\$1	130,699	\$17,364				
Sea bass.....	1,443,216	37,156						
Tautog.....	7,715	200						
Crabs, hard.....							181,101	\$14,167
Lobsters.....	469,665	92,685						
Clams:								
Hard, public.....					24,321	\$4,380		
Hard, private.....					63,158	7,101		
Surf or skimmer.....					136,250	6,175		
Total.....	1,920,606	130,042	130,699	17,364	223,729	17,656	181,101	14,167

Species	Dredges—Continued				Tongs		Rakes	
	Oyster		Scallop					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:								
Hard.....					7,980	\$229	11,780	\$295
Soft.....					3,520	108	3,720	93
Clams:								
Hard, public.....	4,200	\$552			705,753	107,798	460,006	59,345
Hard, private.....	18,428	4,212			8,456	2,141	7,200	3,600
Oysters:								
Market, public, spring.....					13,035	1,507	3,550	500
Market, public, fall.....					49,398	4,405	1,573	185
Market, private, spring.....	92,625	13,452			58,854	7,886	4,089	777
Market, private, fall.....	8,180,907	770,620			117,955	15,776	38,668	6,075
Scallops, sea.....			240,234	\$14,030				
Total.....	8,296,160	788,836	240,234	14,030	964,951	139,850	530,586	70,870

*Fisheries of New Jersey, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Forks		Hoes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Crabs, king.....					37,500	\$80
Clams:						
Hard, public.....					64,648	11,825
Soft, public.....			668,240	\$25,965		
Mussels, sea.....					4,000	200
Oysters:						
Market, private, spring.....					2,550	450
Market, private, fall.....					425	50
Terrapin, diamond-back.....					515	180
Bloodworms.....	3,505	\$3,774				
Sandworms.....	10,566	11,181				
Total.....	14,071	14,955	668,240	25,965	109,638	12,785

## SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	Number		Number		Number		Number	
On vessels.....	1,645						1,645	
On boats and shore:								
Regular.....			65		18		83	
Casual.....			116		23		139	
Total.....	1,645		181		41		1,867	
Vessels:								
Sail.....	150						150	
Net tonnage.....	3,011						3,011	
Boats:								
Motor.....			71		33		104	
Other.....			97		7		104	
Apparatus:								
Number.....	300		181		40		521	
Yards at mouth.....	356						356	
CATCH								
Oysters:	Bushels	Value	Bushels	Value	Bushels	Value	Bushels	Value
Seed, public, spring.....	1,033,400	\$362,040	69,502	\$16,927	8,435	\$1,859	1,111,337	\$380,826
Seed, public, fall.....			26,750	6,688	250	100	27,000	6,788
Total.....	1,033,400	362,040	96,252	23,615	8,685	1,959	1,138,337	387,614

NOTE.—Of the number of persons fishing for seed oysters, 929 in the dredge fishery, 178 in the tong fishery, and 39 in the rake fishery are duplicated among those fishing for market oysters or in fisheries for other species. Similarly, 81 vessels, and 162 dredges in the dredge fishery; 68 motor boats, all the other boats and 178 tongs in the fishery with tongs; and 31 motor boats, 3 other boats, and 38 rakes in the fishery by rakes are duplicated.

## PENNSYLVANIA

*Fisheries of Pennsylvania, 1932<sup>1</sup>*

## OPERATING UNITS: BY GEAR

Item	Haul seines
	Number
Fishermen, on boats and shore, casual.....	51
Boats:	
Other.....	12
Apparatus:	
Number.....	13
Length, yards.....	1,735

<sup>1</sup> The fisheries of Pennsylvania are confined to Bucks County.

*Fisheries of Pennsylvania, 1932—Continued*

## CATCH: BY GEAR

Species	Haul seines	
	Pounds	Value
Alewives.....	10,000	\$100
Carp.....	950	91
Shad.....	2,029	608
Suckers.....	18,750	940
Total.....	31,729	1,739

## DELAWARE

*Fisheries of Delaware, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines		Pound nets
		Drift	Run- around	Stake	Hand	Trawl	
<b>Fishermen:</b>							
On boats and shore:	Number	Number	Number	Number	Number	Number	Number
Regular.....	12	10	12	17	23	5	2
Casual.....	240	62	19	30	9	9	33
Total.....	252	72	31	47	32	14	35
<b>Boats:</b>							
Motor.....		26	13	4	9	5	
Other.....	64	10	3	18	4	1	19
Accessory boats.....	1			1			1
<b>Apparatus:</b>							
Number.....	60	52	19	162	37	21	55
Length, yards.....	18,425						
Square yards.....		136,675	27,900	12,890			
Hooks, baits, or snoods.....					74	15,300	

Item	Stop nets	Fyke nets	Dip nets	Cast nets	Pots		Spears
					Eel	Lobster	
<b>Fishermen:</b>							
On boats and shore:	Number	Number	Number	Number	Number	Number	Number
Regular.....	2	13	10		14	13	
Casual.....	37	23	11	1	14		6
Total.....	39	36	21	1	28	13	6
<b>Boats:</b>							
Motor.....		6			2	4	2
Other.....	19	15	11		13		3
Accessory boats.....	1						
<b>Apparatus:</b>							
Number.....	35	187	21	1	643	185	6
Square yards.....	7,984						

*Fisheries of Delaware, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Dredges			Tongs	Gaffs	By hand	Total, exclusive of duplication
	Clam	Crab	Oyster				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	11	19	63				72
On boats and shore:							
Regular.....	7			26			67
Casual.....	4			38	1	12	415
Total.....	22	19	63	64	1	12	554
<b>Vessels:</b>							
Motor.....	4	6	11				14
Net tonnage.....	64	108	165				221
<b>Boats:</b>							
Motor.....	6			2			53
Other.....				56			149
Accessory boats.....				9			13
<b>Apparatus:</b>							
Number.....	20	12	22	64	1		
Yards at mouth.....	19	18	28				

## CATCH: BY GEAR

Species	Haul seines		Gill nets					
			Drift		Runaround		Stake	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives.....	1,361,700	\$3,910	44,100	\$409			280,650	\$2,053
Bluefish.....			8,625	448			665	27
Carp.....	12,350	809						
Catfish and bullheads.....	1,775	122					13	1
Croaker.....	23,045	460	20,900	350	1,524	\$25		
Eels.....	510	63						
Flounders.....	1,300	78					9,337	561
Herring, sea.....	17,000	300						
King whiting or "kingfish".....	532	33						
Mullet.....					184,500	1,950	7	1
Shad.....	5,616	728	10,300	1,327			110	12
Spot.....			19,500	689				
Squeteagues or "sea trout", gray.....	56,600	2,547	25,600	1,181	198	10	8,150	425
Striped bass.....	1,222	150					7,012	1,030
Sturgeon.....			1,600	304				
White perch.....	10,852	527					8,454	384
Yellow perch.....	4,245	281						
Total.....	1,496,747	10,008	130,625	4,708	186,222	1,985	314,398	4,494

*Fisheries of Delaware, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Stop nets	
	Hand		Trawl					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					30,000	\$550		
Bluefish	972	\$58						
Carp					1,203	93	17,050	\$1,372
Catfish and bullheads					3,000	183	272	11
Cod			29,000	\$876				
Croaker	20,671	668						
Eels					1,571	156		
Flounders					125	12		
Scup or porgy	5,400	216						
Sea bass	3,900	175						
Squeteagues or "sea trout", gray	15,411	1,324						
Striped bass					20	5		
Tautog	61,000	1,860						
White perch					3,029	159		
Yellow perch					320	17	160	11
Crabs, king					439,800	632		
Total	107,354	4,301	29,000	876	479,068	1,807	17,482	1,394

Species	Fyke nets		Dip nets		Cast nets		Pots	
							Eel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	18, 550	\$346						
Carp.....	126	5			100	\$8		
Catfish and bullheads.....	868	38						
Eels.....	2, 323	225					26, 544	\$2, 669
Flounders.....	1, 109	68						
Striped bass.....	190	38						
White perch.....	5, 470	279						
Yellow perch.....	865	59						
Crabs, soft.....			23, 400	\$3, 514				
Turtles, snapper.....	1, 500	80						
Total.....	31, 001	1, 138	23, 400	3, 514	100	8	26, 544	2, 669

Species	Pots—Con.		Spears		Dredges			
	Lobster				Clam		Crab	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....			300	\$12				
Catfish and bulheads.....			180	12				
Eels.....			180	13				
Crabs, hard.....							262, 500	\$4, 000
Lobsters.....	11, 050	\$2, 763						
Clams, hard, public.....					18, 500	\$4, 375	2, 000	500
Total.....	11, 050	2, 763	660	37	18, 500	4, 375	264, 500	4, 500

Species	Dredges—Con.		Tongs		Gaffs		By hand	
	Oyster							
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:								
Hard.....	78, 125	\$937						
King.....							55, 000	\$83
Clams, hard, public.....			9, 000	\$1, 800				
Mussels, sea.....			23, 400	2, 250				
Oysters:								
Market, public, fall.....			120, 300	15, 880				
Market, private, fall.....	301, 374	30, 892	4, 920	630				
Turtles, snapper.....					100	\$5		
Total.....	379, 499	31, 829	157, 620	20, 560	100	5	55, 000	83

*Fisheries of Delaware, 1932—Continued*

## SEED OYSTER FISHERY: BY GEAR

Item	Dredges, oyster		Tongs		Rakes		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	<i>Number</i>		<i>Number</i>		<i>Number</i>		<i>Number</i>	
On vessels.....	71						71	
On boats and shore:								
Regular.....	3		25		1		29	
Casual.....			45				45	
Total.....	74		70		1		145	
Vessels:								
Motor.....	11						11	
Net tonnage.....	152						152	
Sail.....	2						2	
Net tonnage.....	25						25	
Total vessels.....	13						13	
Total net tonnage.....	177						177	
Boats:								
Motor.....	1		7				8	
Other.....			62		1		63	
Apparatus:								
Number.....	28		70		1		99	
Yards at mouth.....	33						33	
CATCH								
Oysters:	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>
Seed, public, spring.....	76,050	\$17,698	28,920	\$6,690	500	\$100	105,470	\$24,488
Seed, public, fall.....			2,400	590			2,400	590
Total.....	76,050	17,698	31,320	7,280	500	100	107,870	25,078

NOTE.—Of the number of persons fishing for seed oysters, 29 in the dredge fishery, 63 in the fishery by tongs, and the 1 person in the rake fishery are duplicated among those in the market oyster fishery or in fisheries for other species. Similarly, 4 motor vessels, all the sail vessels, and 12 dredges in the dredge fishery; and 2 motor boats, 56 other boats, and 63 tongs in the fishery by tongs are duplicated.

VESSEL FISHERIES AT NEW YORK CITY AND GROTON, CONN. <sup>5</sup>

During 1932 fishing vessels of 5 net tons capacity or greater landed 35,601,941 pounds of fishery products at New York City and Groton, Conn. This is 31 percent less than during the previous year. The landings consisted of bluefish, 1,752,250 pounds; cod, 1,773,998 pounds; flounders, 7,797,021 pounds; haddock, 17,135,977 pounds; hake, 47,085 pounds; halibut, 1,916 pounds; mackerel, 2,565,000 pounds; pollock, 118,043 pounds; scup or porgies, and sea bass, 708,200 pounds; tilefish, 1,875,800 pounds; scallops, 1,725,845 pounds; and miscellaneous species 100,806 pounds.

It is estimated that during the year there were approximately 15,000,000 pounds of fish and shellfish landed at New York City by craft under 5 net tons.

## SHAD FISHERY OF THE HUDSON RIVER

The shad fishery of the Hudson River in 1932 was prosecuted by 274 fishermen, who used 3 motor boats, 129 other boats, 110 drift gill nets, having a total area of 376,884 square yards, 16 stake gill nets, having a total area of 18,748 square yards, and 2 haul seines

<sup>5</sup> Statistics on the landings at New York City are collected by J. H. Matthews, executive secretary, Middle Atlantic Fisheries Association, and forwarded to this Bureau where they are combined with Groton landings. The statistics for the two ports are combined to avoid disclosure of individual enterprise.

having a combined length of 277 yards. The total catch was 159,358 shad, having a weight of 529,754 pounds, and a value to the fishermen of \$50,849. This is an increase of slightly over 26 percent in number and 2 percent in value as compared with 1931. The average price per pound received by the fishermen in 1932 was about 10 cents, as compared with 12 cents in 1931.

Nearly 66 percent of the shad in weight were taken in drift gill nets and 34 percent in stake gill nets. Small quantities amounting to less than one-half of 1 percent of the total were taken by haul seines, and incidentally with gear being fished primarily for other species.

With the exception of some fishing with stake gill nets from one town in New Jersey, the fishery was prosecuted entirely from points in New York.

*Shad fishery of the Hudson River, 1932*

Item	New York			New Jersey			Total		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
<b>Fishermen:</b>									
On boats and shore:									
Regular.....	54			4			58		
Casual.....	191			25			216		
Total.....	245			29			274		
<b>Boats:</b>									
Motor.....				3			3		
Other.....	122			7			129		
<b>Apparatus:</b>									
Haul seines.....	2						2		
Length, yards.....	277						277		
Gill nets:									
Drift.....	110						110		
Square yards.....	376,884						376,884		
Stake.....	10			6			16		
Square yards.....	9,072			9,676			18,748		
<b>Shad caught:</b>									
With haul seines.....	535	1,350	\$150				535	1,350	\$150
With drift gill nets.....	107,753	347,354	33,468				107,753	347,354	33,468
With stake gill nets.....	13,032	48,950	6,454	38,000	132,000	\$10,762	51,032	180,950	17,216
Incidentally.....	38	100	15				38	100	15
Total.....	121,358	397,754	40,087	38,000	132,000	10,762	159,358	529,754	50,849

## FISHERIES OF THE CHESAPEAKE BAY STATES

(Area XXIII <sup>6</sup>)

The yield of the commercial fisheries in the Chesapeake Bay States (Maryland and Virginia) during 1932 amounted to 359,007,494 pounds, valued at \$5,904,989 to the fisherman, representing an increase of 26 percent in volume but a decrease of 18 percent in value as compared with the catch in the previous year. In addition, there was a production of 1,475,053 bushels of seed oysters, valued at \$158,640. These fisheries gave employment to 21,084 fishermen, including those in the fishery for seed oysters.

<sup>6</sup> This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there are included under this area craft owned in the area but at times fishing elsewhere. A notable example is the southern trawl fishery, which extends into area XXIV. Data on the operating units and catch of the fisheries of the Chesapeake Bay States have been taken largely from statistics collected by the State fishery agencies of Maryland and Virginia. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. It should be observed that the persons engaged, gear and craft employed, and catch of the seed-oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section.

*Fisheries of the Chesapeake Bay States, 1932*

## SUMMARY OF CATCH

Product	Maryland		Virginia		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Fish.....	15,667,697	\$473,406	251,439,634	\$2,074,917	267,107,331	\$2,548,323
Shellfish, etc.....	45,958,756	1,466,310	45,941,407	1,890,356	91,900,163	3,356,666
Total.....	61,626,453	1,939,716	297,381,041	3,965,273	359,007,494	5,904,989

## OPERATING UNITS: BY STATES

Item	Maryland	Virginia	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	767	1,289	2,056
On boats and shore:			
Regular.....	5,628	6,613	12,241
Casual.....	2,422	4,227	6,649
Total.....	8,817	12,129	20,946
<b>Vessels:</b>			
Steam.....		19	19
Net tonnage.....		2,021	2,021
Motor.....	1	109	110
Net tonnage.....	9	1,759	1,768
Sail.....	187	6	193
Net tonnage.....	1,966	39	2,005
Total vessels.....	188	134	322
Total net tonnage.....	1,975	3,819	5,794
<b>Boats:</b>			
Motor.....	3,721	4,495	8,216
Other.....	2,329	3,685	6,014
Accessory boats.....		52	52
<b>Apparatus:</b>			
Purse seines:			
Menhaden.....		26	26
Length, yards.....		7,860	7,860
Other.....		1	1
Length, yards.....		300	300
Haul seines.....	211	91	302
Length, yards.....	26,946	24,223	51,169
Gill nets:			
Anchor.....	29		29
Square yards.....	12,274		12,274
Drift.....	158	457	615
Square yards.....	317,040	424,443	741,483
Stake.....	3,345	7,822	11,167
Square yards.....	249,499	358,317	607,816
Lines:			
Hand.....	16		16
Hooks.....	64		64
Trot with baits or snoods.....	1,227	994	2,221
Baits or snoods.....	792,370	580,385	1,372,755
Pound nets.....	655	2,019	2,674
Stop nets.....	3	4	7
Square yards.....	5,400	9,450	14,850
Fyke nets.....	1,183	690	1,873
Dip nets.....	1,523	1,349	2,872
Otter trawls.....		27	27
Yards at mouth.....		769	769
Pots, eel.....	9,940	14	9,954
Scrapes.....	956	80	1,036
Yards at mouth.....	956	80	1,036
Dredges:			
Crab.....		126	126
Yards at mouth.....		251	251
Oyster.....	538	256	794
Yards at mouth.....	650	347	997
Scallop.....		610	610
Yards at mouth.....		407	407
Tongs.....	4,962	5,641	10,603
Rakes.....	98	894	992
Picks.....		726	726



*Fisheries of the Chesapeake Bay States, 1932—Continued*

## CATCH: BY STATES

Species	Maryland		Virginia		Total	
FISH	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	7, 552, 695	\$52, 361	13, 852, 493	\$64, 521	21, 405, 188	\$116, 882
Black bass.....	33, 658	3, 600	-----	-----	33, 658	3, 600
Bluefish.....	360, 129	20, 640	550, 739	25, 490	910, 868	46, 139
Bonito.....	5, 120	226	50, 420	2, 321	55, 540	2, 547
Butterfish.....	990, 424	30, 304	2, 906, 623	84, 189	3, 897, 047	114, 493
Cabio or crab eater.....	2, 000	50	2, 515	50	4, 515	100
Carp.....	123, 050	9, 148	240, 146	10, 335	363, 196	19, 483
Catfish and bullheads.....	186, 747	6, 601	695, 857	21, 200	882, 604	27, 801
Cod.....	-----	-----	21, 950	521	21, 950	521
Croaker.....	1, 321, 621	26, 954	14, 692, 706	251, 539	16, 014, 327	278, 493
Drum:						
Black.....	34, 204	344	29, 362	297	63, 566	641
Red or redfish.....	13, 670	358	25, 259	822	38, 929	1, 180
Eels.....	308, 536	19, 547	26, 326	1, 374	334, 862	20, 921
Flounders.....	97, 990	4, 386	1, 190, 389	48, 385	1, 288, 379	52, 771
Gizzard shad.....	14, 339	289	90, 734	1, 813	105, 073	2, 102
Haddock.....	-----	-----	460	10	460	10
Hake.....	-----	-----	31, 084	574	31, 084	574
Harvestfish.....	7, 690	568	93, 988	2, 369	101, 678	2, 937
Hickory shad.....	10, 668	492	48, 311	970	58, 979	1, 462
King whiting or "kingfish".....	6, 200	248	26, 930	955	33, 130	1, 203
Mackerel.....	2, 560	125	23, 517	1, 136	26, 017	1, 261
Menhaden.....	-----	-----	195, 485, 600	652, 536	195, 485, 600	652, 536
Mullet.....	15, 765	783	32, 314	1, 196	48, 079	1, 979
Pigfish.....	-----	-----	33, 457	1, 256	33, 457	1, 256
Pike or pickerel.....	18, 073	2, 978	-----	-----	18, 073	2, 978
Pompano.....	490	112	-----	-----	490	112
Scup.....	35, 900	1, 523	1, 711, 820	45, 457	1, 747, 720	46, 980
Sea bass.....	119, 060	3, 584	840, 864	24, 370	959, 924	27, 954
Sea robin.....	475	5	-----	-----	475	5
Shad.....	1, 667, 452	155, 535	4, 847, 487	424, 316	6, 514, 939	579, 851
Silver perch.....	21, 360	439	-----	-----	21, 360	439
Skates.....	1, 225	15	-----	-----	1, 225	15
Spanish mackerel.....	-----	-----	62, 834	3, 849	62, 834	3, 849
Spot.....	47, 377	1, 498	753, 318	22, 264	800, 695	23, 762
Squeteagues or "sea trout":						
Gray.....	1, 805, 364	52, 377	11, 974, 271	286, 927	13, 779, 635	339, 304
Spotted.....	4, 060	432	84, 487	5, 501	88, 547	5, 933
Striped bass.....	433, 811	56, 300	594, 299	71, 455	1, 028, 110	127, 755
Sturgeon.....	210	52	4, 832	795	5, 042	847
Suckers.....	1, 500	47	-----	-----	1, 500	47
Tautog.....	175	4	232	7	407	11
Thimble-eyed mackerel.....	-----	-----	11, 619	232	11, 619	232
White perch.....	323, 808	14, 737	318, 191	11, 516	641, 999	26, 253
Yellow perch.....	100, 411	6, 735	84, 200	4, 369	184, 611	11, 104
Total.....	15, 667, 697	473, 406	251, 439, 634	2, 074, 917	267, 107, 331	2, 548, 323
SHELLFISH, ETC.						
Crabs:						
Hard.....	29, 399, 178	291, 130	27, 024, 045	290, 821	56, 423, 223	581, 951
Soft.....	3, 540, 253	227, 674	1, 549, 061	91, 810	5, 089, 314	319, 484
Lobsters.....	-----	-----	33	6	33	6
Squid.....	2, 200	66	320, 954	6, 387	323, 154	6, 453
Clams, hard, public.....	27, 048	4, 734	1, 484, 464	347, 647	1, 511, 512	352, 381
Oysters: <sup>1</sup>						
Market, public, spring.....	4, 343, 805	335, 021	1, 614, 674	112, 094	5, 958, 479	447, 115
Market, public, fall.....	7, 762, 740	523, 540	4, 446, 419	280, 271	12, 209, 159	803, 811
Market, private, spring.....	610, 888	59, 277	3, 420, 102	274, 804	4, 030, 990	334, 081
Market, private, fall.....	267, 925	24, 005	5, 423, 053	406, 423	5, 690, 978	430, 428
Scallops:						
Bay.....	-----	-----	658, 584	80, 090	658, 584	80, 090
Sea.....	-----	-----	18	3	18	3
Terrapin, diamond-back.....	3, 378	823	-----	-----	3, 378	823
Turtles, snapper.....	1, 311	40	-----	-----	1, 341	40
Total.....	45, 958, 756	1, 466, 310	45, 941, 407	1, 890, 356	91, 900, 163	3, 356, 666
Grand total.....	61, 626, 453	1, 939, 716	297, 381, 041	3, 965, 273	359, 007, 494	5, 904, 989

<sup>1</sup> Statistics on oysters used in this table are based on yields of 6.66 pounds of meats to the bushel for market oysters in Maryland and 6.51 pounds in Virginia.

*Fisheries of the Chesapeake Bay States, 1932—Continued*

## PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maryland		Virginia		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number.....	88,197,534	\$291,130	81,072,135	\$290,821	169,269,669	\$581,951
Soft.....do.....	14,161,012	227,674	6,196,244	91,810	20,357,256	319,484
Clams, hard.....bushels.....	3,381	4,734	185,558	347,647	188,939	352,381
Oysters:						
Market, public, spring.....do.....	652,419	335,021	248,030	112,094	900,449	447,115
Market, public, fall.....do.....	1,165,927	523,540	683,014	280,271	1,848,941	803,811
Market, private, spring.....do.....	91,752	59,277	525,361	274,804	617,113	334,081
Market, private, fall.....do.....	40,241	24,005	833,034	406,423	873,275	430,428
Scallops:						
Bay.....do.....			109,764	80,090	109,764	80,090
Sea.....do.....			3	3	3	3

## SEED OYSTER FISHERY

Item	Maryland		Virginia		Total	
OPERATING UNITS						
Fishermen:						
On boats and shore:	Number		Number		Number	
Regular.....		126		1,174		1,300
Casual.....				447		447
Total.....		126		1,621		1,747
Boats:						
Motor.....		58		688		746
Other.....				184		184
Apparatus:						
Tongs.....		126		1,265		1,391
Rakes.....				86		86
CATCH						
Oysters:						
Seed, public, spring.....	Bushels	Value	Bushels	Value	Bushels	Value
Seed, public, fall.....	7,043	\$1,056	557,962	\$67,519	565,005	\$68,575
Seed, private, spring.....			897,048	89,025	897,048	89,025
Seed, private, fall.....			13,000	1,040	13,000	1,040
Total.....	7,043	1,056	1,468,010	157,584	1,475,053	158,640

NOTE.—Of the number of persons fishing for seed oysters, all of those in Maryland and 1,483 in Virginia—a total of 1,609 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: All craft and gear in Maryland and 634 motor boats, 172 other boats, 1,165 tongs, and 86 rakes in Virginia—a total of 692 motor boats, 172 other boats, 1,291 tongs, and 86 rakes.

## MARYLAND

*Fisheries of Maryland, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines		Pound nets	Stop nets	Fyke nets
		Anchor	Drift	Stake	Hand	Trot with baits or snoods			
Fishermen:									
On boats and shore:	Number	Number	Number	Number	Number	Number	Number	Number	Number
Regular.....	185	6	55	107	16	983	544	4	63
Casual.....	333	8	226	94		268	101	3	41
Total.....	518	14	281	201	16	1,251	645	7	104
Boats:									
Motor.....	95	6	85	87	8	1,079	216	3	41
Other.....	229	6	71	69		138	175	3	57
Apparatus:									
Number.....	211	29	158	3,345	16	1,227	655	3	1,183
Length, yards.....	26,946								
Square yards.....		12,274	317,040	249,499				5,400	
Hooks, baits, or snoods.....					64	792,370			

## Fisheries of Maryland, 1932—Continued

## OPERATING UNITS: BY GEAR—Continued

Item	Dip nets	Pots, eel	Scrapes	Dredges, oyster	Tongs	Rakes	By hand	Total exclusive of dup- lication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....				767				767
On boats and shore:								
Regular.....	840	134	431	190	3,893	84	29	5,628
Casual.....	683	48			1,073	14	8	2,422
Total.....	1,523	182	431	957	4,966	98	37	8,817
Vessels:								
Motor.....				1				1
Net tonnage.....				9				9
Sail.....				187				187
Net tonnage.....				1,966				1,966
Total vessels.....				188				188
Total net tonnage.....				1,975				1,975
Boats:								
Motor.....	358	130		31	2,477	5		3,721
Other.....	1,262	38	369	50	206	93	37	2,329
Apparatus:								
Number.....	1,523	9,940	956	538	4,962	98		
Yards at mouth.....			956	650				

## CATCH: BY GEAR

Species	Haul seines		Gill nets					
			Anchor		Drift		Stake	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives.....	378,424	\$3,360	200	\$4	400	\$9	33,205	\$468
Black bass.....	23,381	2,382						
Bluefish.....	68,106	4,668	4,200	326	8,668	593	4,916	319
Butterfish.....	5,000	200						
Carp.....	101,821	7,761					250	14
Catfish and bullheads.....	61,524	2,235	300	15			3,480	146
Croaker.....	281,930	5,645					7,000	155
Drum, red or redfish.....	500	19						
Eels.....	1,908	107						
Flounders.....	2,520	120						
Gizzard shad.....	800	13						
Mullet.....	641	23					14,112	706
Pike or pickerel.....	13,148	2,026					225	34
Shad.....	52,987	2,785			384,785	30,353	304,208	21,980
Silver perch.....	1,300	39						
Spot.....	3,834	140					1,020	41
Squeteagues or "sea trout":								
Gray.....	82,058	3,808	800	40	800	48	2,350	102
Spotted.....	1,600	176						
Striped bass.....	99,360	13,026	18,750	2,280	77,473	10,167	76,715	10,100
Suckers.....	1,200	38						
White perch.....	80,325	3,171	2,005	128	3,000	171	7,030	431
Yellow perch.....	23,742	1,680			600	36	4,835	274
Crabs, soft.....	151,083	13,459						
Turtles, snapper.....	1,341	40						
Total.....	1,438,533	66,930	26,255	2,803	475,726	41,377	459,346	34,770

## Fisheries of Maryland, 1932—Continued

CATCH: BY GEAR—Continued

Species	Lines				Pound nets		Stop nets	
	Hand		Trot with baits or snoods					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					7,137,301	\$48,469		
Black bass					3,187	389		
Bluefish	98,600	\$5,916			174,689	8,740		
Bonito	3,820	161			1,300	65		
Butterfish					985,424	30,104		
Cabio or crab eater					2,000	50		
Carp					12,363	693	4,678	\$414
Catfish and bullheads					70,051	2,328		
Croaker	1,000	20			1,026,611	21,032		
Drum:								
Black					34,204	344		
Red or redfish					13,170	339		
Eels					20,007	1,211		
Flounders	1,600	80			93,670	4,174		
Gizzard shad					13,539	276		
Harvestfish					7,690	568		
Hickory shad					10,668	492		
King whiting or "kingfish"					6,200	248		
Mackerel					2,500	125		
Mullet					669	33		
Pike or pickerel					686	115		
Pompano					490	112		
Scup	17,500	787			18,400	736		
Sea bass	116,200	3,486			2,860	98		
Sea robin					475	5		
Shad					925,292	100,385		
Silver perch					20,000	400		
Skates					1,225	15		
Spot					42,523	1,317		
Squeteagues or "sea trout":								
Gray	13,500	405			1,704,756	47,924		
Spotted					2,460	256		
Striped bass					160,600	20,601		
Sturgeon					210	52		
Suckers					200	6		
Tautog					175	4		
White perch					196,303	9,015		
Yellow perch					11,287	624		
Crabs:								
Hard			27,071,510	\$263,488				
Soft			16,625	1,156				
Squid					2,200	66		
Total	252,220	10,855	27,088,135	264,644	12,705,385	301,411	4,678	414

Species	Fyke nets		Dip nets		Pots, eel		Scrapes		
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Alewives.....	3,165	\$42							
Black bass.....	7,009	829							
Bluefish.....	950	77							
Carp.....	3,938	266							
Catfish and bullheads.....	51,392	1,877							
Croaker.....	5,080	102							
Eels.....	2,708	195			283,913	\$18,034			
Flounders.....	200	12							
Mullet.....	343	21							
Pike or pickerel.....	4,014	803							
Shad.....	180	32							
Squeteagues or "sea trout",									
gray.....	1,100	50							
Striped bass.....	913	126							
Suckers.....	100	3							
White perch.....	35,145	1,821							
Yellow perch.....	59,947	4,121							
Crabs:									
Hard.....			1,668,950	\$19,444			658,688	\$8,198	
Soft.....			2,741,335	178,187			631,210	34,872	
Total.....	176,265	10,377	4,410,315	197,631	283,913	18,034	1,289,898	43,070	

*Fisheries of Maryland, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dredges, oyster		Tongs		Rakes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Clams, hard, public.....			13, 528	\$2, 368	10, 800	\$1, 890	2, 720	\$476
Oysters:								
Market, public, spring.....	768, 935	\$56, 061	3, 574, 870	278, 960				
Market, public, fall.....	1, 662, 240	98, 405	6, 100, 500	425, 135				
Market, private, spring.....	151, 472	16, 124	459, 416	43, 153				
Market, private, fall.....	77, 833	8, 352	190, 092	15, 653				
Terrapin, diamond-back.....							3, 378	823
Total.....	2, 660, 480	178, 942	10, 338, 406	765, 269	10, 800	1, 890	6, 098	1, 299

## SEED OYSTER FISHERY: BY GEAR

Item	Tongs	
OPERATING UNITS		
	Number	
Fishermen, on boats and shore—Regular.....	126	
Boats—Motor.....	58	
Apparatus—Number.....	126	
CATCH		
	Bushels	Value
Oysters, seed, public, spring.....	7, 043	\$1, 056

NOTE.—The seed oyster fishery in Maryland is confined to Kent County. All fishermen, craft, and gear are duplicated among those used in the market oyster fishery or fisheries for other species.

## VIRGINIA

*Fisheries of Virginia, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines, trot with baits or snoods	Pound nets
	Men-haden	Other		Drift	Stake		
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	873	7					
On boats and shore:							
Regular.....			214	119	141	922	1, 688
Casual.....			159	591	146	72	470
Total.....	873	7	373	710	287	994	2, 158
Vessels:							
Steam.....	19						
Net tonnage.....	2, 021						
Motor.....	7	1					
Net tonnage.....	627	9					
Total vessels.....	26	1					
Total net tonnage.....	2, 648	9					
Boats:							
Motor.....			71	74	137	734	620
Other.....			103	383	62	260	664
Accessory boats.....	52						
Apparatus:							
Number.....	26	1	91	457	7, 822	994	2, 019
Length, yards.....	7, 860	300	24, 223				
Square yards.....				424, 443	358, 317		
Hooks, baits, or snoods.....						580, 385	

*Fisheries of Virginia, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Stop nets	Fyke nets	Dip nets	Otter trawls	Pots, eel	Scrapes
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....				116		
On boats and shore:						
Regular.....	5	71	343		2	50
Casual.....	4	77	1,006			
Total.....	9	148	1,349	116	2	50
<b>Vessels:</b>						
Motor.....				27		
Net tonnage.....				405		
<b>Boats:</b>						
Motor.....	4	50	162			
Other.....	4	68	988		2	30
<b>Apparatus:</b>						
Number.....	4	690	1,349	27	14	80
Square yards.....	9,450					
Yards at mouth.....				769		80

  

Item	Dredges			Tongs	Rakes	Picks	By hand	Total, exclusive of duplication
	Crab	Oyster	Scallop					
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	186	100		10				1,289
On boats and shore:								
Regular.....	21	202	308	4,387	889	746	321	6,613
Casual.....				2,055	24		60	4,227
Total.....	207	302	308	6,452	913	746	381	12,129
<b>Vessels:</b>								
Steam.....								19
Net tonnage.....								2,021
Motor.....	56	16		3				109
Net tonnage.....	484	226		17				1,759
Sail.....		6						6
Net tonnage.....		39						39
Total vessels.....	56	22		3				134
Total net tonnage.....	484	265		17				3,819
<b>Boats:</b>								
Motor.....	7	104	154	3,250	176	72	30	4,495
Other.....		2	117	697	805	695	332	3,685
Accessory boats.....								52
<b>Apparatus:</b>								
Number.....	126	256	610	5,641	894	726		
Yards at mouth.....	251	347	407					

*Fisheries of Virginia, 1932—Continued*

## CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Menhaden		Other				Drift	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					39,605	\$449	9,176	\$141
Bluefish			14,824	\$408	58,013	2,482	16,100	813
Butterfish			640	8	1,900	76		
Carp					145,515	6,577	1,800	72
Catfish and bullheads					247,851	7,578		
Croaker					576,479	10,425	69,716	1,054
Drum, red or redfish					10,390	349		
Eels					475	18		
Flounders					20,419	817		
Gizzard shad					12,865	258	5,636	111
Hickory shad					808	21	3,182	64
Menhaden	193,920,600	\$648,692						
Mullet					2,120	68	59	2
Pigfish					16,466	658		
Scup			770	19				
Sea bass			65	2				
Shad					8,053	817	563,863	42,249
Spot					128,921	3,861	13,124	394
Squeteagues or "sea trout":								
Gray			109,600	2,271	261,488	6,622	1,505	45
Spotted					59,167	3,747		
Striped bass					94,194	11,137	50,296	7,106
White perch					117,192	4,188		
Yellow perch					16,820	861		
Total	193,920,600	648,692	125,899	2,708	1,818,741	61,009	734,457	52,051

Species	Gill nets—Con.		Lines, trot with baits or snoods		Pounds nets		Stop nets	
	Stake							
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	12,800	\$182			13,768,672	\$63,519		
Bluefish.....	400	24			460,389	21,679		
Bonito.....					50,420	2,321		
Butterfish.....					2,887,760	83,387		
Cabio or crab eater.....					2,515	50		
Carp.....					57,582	2,264	19,581	\$793
Catfish and bullheads.....					213,741	6,411	3,084	92
Cod.....					10,664	264		
Croaker.....	28,784	726			12,358,846	201,024		
Drum:								
Black.....					29,362	297		
Red or redfish.....					14,734	469		
Eels.....					15,999	953		
Flounders.....					557,599	22,454		
Gizzard shad.....	15,685	314			32,725	654		
Harvestfish.....					93,988	2,369		
Hickory shad.....	410	8			43,311	865		
King whiting or "kingfish".....					10,215	383		
Mackerel.....					23,517	1,136		
Menhaden.....					1,565,000	3,844		
Mullet.....	19,007	703			4,413	161		
Piefish.....					13,938	541		
Scup.....					22,084	881		
Sea bass.....					5,394	241		
Shad.....	444,708	34,485			3,818,541	345,492		
Spanish mackerel.....					62,766	3,843		
Spot.....	2,225	79			606,994	17,878		
Squeteagues or "sea trout":								
Gray.....	11,450	458			11,336,817	267,819		
Spotted.....					25,155	1,742		
Striped bass.....	83,366	9,684			327,037	39,159		
Sturgeon.....					4,345	710		
Thimble-eyed mackerel.....					11,619	232		
White perch.....					102,047	3,369		
Yellow perch.....					3,122	181		
Crabs, hard.....			18,302,400	\$181,741	115,000	863		
Squid.....					310,318	6,206		
Total.....	621,835	46,663	18,302,400	181,741	48,966,629	1,103,661	22,665	885

*Fisheries of Virginia, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Fyke nets		Dip nets		Otter trawls	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Alewives.....	22, 200	\$229			40	\$1
Bluefish.....					1, 013	84
Butterfish.....					16, 323	718
Carp.....	15, 668	629				
Catfish and bullheads.....	231, 181	7, 119				
Cod.....					11, 286	257
Croaker.....	65, 256	1, 382			1, 593, 625	36, 928
Drum, red or redfish.....					135	4
Eels.....	6, 370	312			3, 062	66
Flounders.....	10, 610	410			601, 761	24, 704
Gizzard shad.....	23, 823	476				
Haddock.....					460	10
Hake.....					31, 084	574
Hickory shad.....	600	12				
King whiting or "kingfish".....					16, 715	572
Mullet.....	6, 715	262				
Pigfish.....					3, 053	57
Sculp.....					1, 688, 966	44, 557
Sea bass.....					835, 405	24, 127
Shad.....	12, 322	1, 273				
Spanish mackerel.....					68	6
Spot.....					2, 054	52
Squeteagues or "sea trout":						
Gray.....	13, 682	503			239, 729	9, 209
Spotted.....					165	12
Striped bass.....	36, 406	4, 369				
Sturgeon.....					487	85
Tautog.....					232	7
White perch.....	97, 897	3, 938			1, 055	21
Yellow perch.....	64, 258	3, 327				
Crabs:						
Hard.....			326, 509	\$3, 767		
Soft.....			1, 372, 838	81, 041		
Shrimp.....					33	6
Scallops, sea.....					18	3
Squid.....					10, 636	181
Total.....	606, 988	24, 241	1, 699, 347	84, 808	5, 057, 405	142, 241

Species	Pots, eel		Scrapes		Dredges	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Eels.....	420	\$25				
Crabs:						
Hard.....			69, 486	\$869	8, 210, 650	\$103, 581
Soft.....			146, 973	8, 819		
Total.....	420	25	216, 459	9, 688	8, 210, 650	103, 581

Species	Dredges—Continued				Tongs	
	Oyster		Scallop			
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Clams, hard, public.....					1, 032, 272	\$234, 120
Oysters:						
Market, public, spring.....	18, 850	\$1, 375			1, 542, 022	108, 028
Market, public, fall.....	30, 300	1, 810			4, 308, 989	273, 101
Market, private, spring.....	1, 336, 390	104, 075			1, 761, 796	145, 458
Market, private, fall.....	2, 781, 282	201, 541			2, 161, 921	161, 797
Scallops, bay.....			658, 584	\$80, 090		
Total.....	4, 166, 822	308, 801	658, 584	80, 090	10, 807, 000	922, 507



*Fisheries of Virginia, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Rakes		Picks		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Crabs, soft.....					29,250	\$1,850
Clams, hard, public.....	180,224	\$40,709	236,960	\$63,165	35,008	9,653
Oysters:						
Market, public, spring.....	8,976	449			44,826	2,242
Market, public, fall.....	17,478	874			89,652	4,483
Market, private, spring.....	321,916	25,271				
Market, private, fall.....	479,850	43,085				
Total.....	1,008,444	110,388	236,960	63,165	198,736	18,328

## SEED OYSTER FISHERY: BY GEAR

Item	Tongs		Rakes		By hand		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen, on boats and shore:	<i>Number</i>		<i>Number</i>		<i>Number</i>		<i>Number</i>	
Regular.....	1,078		86		10		1,174	
Casual.....	447						447	
Total.....	1,525		86		10		1,621	
Boats:								
Motor.....	674		12		2		688	
Other.....	102		72		10		184	
Apparatus: Number.....	1,265		86				1,351	
CATCH								
Oysters:	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>
Seed, public, spring.....	549,962	\$66,879	4,000	\$320	4,000	\$320	557,962	\$67,519
Seed, public, fall.....	876,048	87,605	13,000	780	8,000	640	897,048	89,025
Seed, private, spring.....			13,000	1,040			13,000	1,040
Total.....	1,426,010	154,484	30,000	2,140	12,000	960	1,468,010	157,584

NOTE.—Of the number of persons fishing for seed oysters all are duplicated among those in the market oyster fishery or fisheries for other species, except in the fishery by tongs, 1,387 are duplicated. Similarly all the craft and gear are duplicates except in the fishery by tongs, 620 motor boats, 90 other boats, and 1,165 tongs are duplicated.

## SHAD AND ALEWIFE FISHERIES OF THE POTOMAC RIVER

The catch of shad in the Potomac River in 1932 amounted to 352,745 roes and 422,711 bucks, having a combined weight of 2,264,168 pounds and a total value to the fishermen of \$173,353. The catch of alewives for the same season amounted to 17,109,533 in number, with a total weight of 6,844,613 pounds and a value to the fishermen of \$24,041. These figures indicate an increase of 10 percent in the weight and a decrease of 10 percent in the value of shad as compared with 1931 and a decrease of 7 percent in the weight and 57 percent in the value of alewives.

About 47 percent of the shad, in weight, was taken in pound nets, 52 percent in gill nets, and the remainder with haul seines. More than 99 percent of the catch of alewives was made in pound nets.

*Shad and alewife fisheries of the Potomac River, 1932*

Item	Maryland			Virginia			Total		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
Fishermen on boats and shore:									
Regular.....	71			316			387		
Casual.....	138			178			316		
Total.....	209			494			703		
Boats:									
Motor.....	61			172			233		
Other.....	58			102			160		
Apparatus:									
Pound nets.....	61			305			366		
Gill nets.....	952			905			1,857		
Square yards.....	215,941			244,712			460,653		
Haul seines.....	2						2		
Length, yards.....	950						950		
Shad caught:									
With pound nets.....	23,211	67,001	\$6,949	348,480	986,484	\$89,945	371,691	1,053,485	\$96,894
With gill nets.....	160,614	499,943	31,986	227,234	668,426	42,571	387,848	1,168,371	74,557
With haul seines.....	15,917	42,312	1,902				15,917	42,312	1,902
Total.....	199,742	609,258	40,837	575,714	1,654,910	132,516	775,456	2,264,168	173,353
Alewives caught:									
With pound nets.....	1,111,000	444,400	2,412	15,849,865	6,340,746	21,247	16,960,865	6,785,146	23,659
With gill nets.....				48,668	19,467	282	48,668	19,467	282
With haul seines.....	100,000	40,000	100				100,000	40,000	100
Total.....	1,211,000	484,400	2,512	15,898,533	6,360,213	21,529	17,109,533	6,844,613	24,041

**TRADE IN FISHERY PRODUCTS IN WASHINGTON, D.C.<sup>7</sup>**

The municipal fish wharf and market in Washington, D.C., is located in the southwestern part of the city on an arm of the Potomac River. At the present time, 16 fishery firms have stalls in the market, 3 firms are in private buildings across the street, and 4 firms have stalls in the new Center Market. Altogether, the 23 above firms employed 113 persons who received \$78,996 in salaries and wages during 1932. Of the total employees, 98 were regularly employed. These firms conduct a wholesale and retail business, chiefly wholesale however.

During the year 1932, the receipts of fresh and frozen fishery products as received at the municipal wharf amounted to 11,434,119 pounds. This is an increase of 23 percent as compared with the year 1931, and an increase of 31 percent as compared with the 5-year average.

During the year 1932, three firms in Washington, D.C., smoked fishery products, which amounted to 271,950 pounds, valued at \$22,847. Of this amount, 238,000 pounds, valued at \$14,280, consisted of herring; 32,900 pounds, valued at \$8,357, were whitefish; while the remainder, 1,050 pounds, valued at \$210, were alewives or "river herring", and eels. There were four firms which shucked oysters mostly for select retail trade. Their production amounted to 8,700 gallons, valued at \$13,530. Most of the smoked fish and shucked oysters were marketed in the city.

<sup>7</sup> Statistics of fishery products handled at the municipal wharf, Washington, D.C., are reported to the Bureau by agents of the city health department.

*Fishery products received at Municipal Fish Wharf and Market, Washington, D.C., 1932*

Species	January	February	March	April	May	June	July
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alewives (river herring)-----	27,750	72,100	124,200	598,500	433,500	-----	-----
Bluefish-----	2,600	4,600	3,200	1,800	10,800	19,300	27,900
Butterfish-----	10,400	3,200	6,200	9,800	100,200	141,426	90,300
Carp-----	13,600	7,000	10,600	23,400	11,200	7,800	1,500
Catfish-----	9,800	15,400	21,800	42,800	8,400	6,700	200
Cod-----	1,000	-----	1,000	200	1,000	300	500
Croaker-----	88,200	36,200	52,200	164,800	191,400	224,800	243,000
Drum, red or redfish-----	-----	-----	650	-----	-----	-----	-----
Eels-----	1,600	2,200	2,150	6,000	1,080	800	200
Flounders-----	29,200	51,000	36,400	15,800	15,600	17,400	26,500
Gizzard shad-----	12,700	5,050	1,800	-----	-----	-----	-----
Haddock-----	31,000	27,300	45,250	34,650	27,650	26,420	23,980
Hake-----	-----	-----	1,800	-----	-----	-----	-----
Halibut-----	15,800	11,050	18,600	9,800	9,266	10,200	5,420
Hickory shad or "jacks"-----	7,850	10,400	3,925	1,600	-----	-----	-----
King whiting or "kingfish"-----	3,000	600	-----	9,400	600	1,600	-----
Mackerel-----	12,400	29,400	19,000	8,000	20,200	25,804	12,400
Mullet-----	400	8,600	1,600	-----	-----	-----	600
Perch-----	9,800	26,200	32,100	68,000	5,600	3,100	1,800
Pike or pickerel-----	600	800	400	400	400	900	800
Pollock-----	400	-----	-----	-----	400	-----	-----
Salmon-----	2,200	3,200	4,400	800	4,400	5,400	3,300
Scup or porgy-----	34,200	17,000	25,800	9,000	8,600	13,600	1,700
Sea bass-----	92,000	72,200	67,200	29,600	6,400	32,402	10,800
Shad-----	17,755	51,585	90,950	1,074,200	500,800	13,400	-----
Smelt-----	2,800	3,200	5,700	-----	-----	-----	-----
Snapper, red-----	800	1,200	100	800	400	700	400
Spot-----	1,000	3,000	1,400	-----	800	1,600	27,400
Squeteagues or "sea trout"-----	60,200	47,800	43,000	97,800	247,900	288,600	204,800
Striped bass-----	5,400	7,000	27,400	35,000	8,200	2,200	2,900
Sturgeon-----	-----	-----	-----	325	300	200	-----
Swordfish-----	-----	-----	375	-----	-----	300	600
Tilefish-----	-----	200	-----	200	-----	-----	-----
Whitefish-----	600	200	-----	-----	200	800	1,300
Whiting-----	500	-----	-----	-----	-----	-----	-----
Crabs:-----	-----	-----	-----	-----	-----	-----	-----
Hard-----	-----	-----	-----	3,075	34,050	102,675	63,450
Soft-----	-----	-----	-----	2,520	13,365	29,520	10,980
Oyster-----	-----	-----	-----	-----	-----	-----	-----
Meat-----	2,430	3,825	4,525	7,800	19,125	39,350	32,705
Sea crawfish or "spiny lobster":-----	-----	-----	-----	-----	-----	-----	-----
Alive-----	-----	-----	50	-----	-----	-----	-----
Lobsters:-----	-----	-----	-----	-----	-----	-----	-----
Alive-----	550	400	700	1,850	950	1,060	440
Meat-----	-----	-----	-----	-----	-----	180	65
Shrimp-----	5,500	11,000	8,250	8,250	8,250	7,875	5,375
Squid-----	2,200	800	600	-----	800	-----	-----
Clams-----	4,352	4,480	5,248	6,016	7,840	8,352	6,304
Oysters:-----	-----	-----	-----	-----	-----	-----	-----
In the shell (meat)-----	71,400	78,680	52,430	16,100	630	-----	-----
Opened (meat)-----	63,262	77,306	77,744	10,981	-----	-----	-----
Scallops-----	400	1,400	920	1,440	400	1,280	680
Frogs-----	-----	-----	-----	-----	-----	-----	9
Turtles-----	-----	-----	-----	250	-----	160	260
Total-----	645,649	695,576	799,667	2,301,557	1,700,706	1,036,204	808,568

*Fishery products received at Municipal Fish Wharf and Market, Washington, D. C.,  
1932—Continued*

Species	August	September	October	November	December	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Alewives (river herring).....						1,256,050
Bluefish.....	26,900	37,500	71,200	39,400	13,800	259,000
Butterfish.....	35,000	23,500	22,800	18,100	2,900	463,826
Carp.....	4,200	12,600	13,200	4,600	8,800	118,500
Catfish.....	600	6,900	30,200	18,700	4,900	166,400
Cod.....	500	300	800	1,000	400	7,000
Croaker.....	270,800	163,300	54,400	83,200	121,000	1,693,300
Drum, red or redfish.....	800	800	1,600	3,400	10,100	17,350
Eels.....	200	900	2,800	1,200		19,130
Flounders.....	29,700	15,800	18,000	26,500	22,800	304,700
Gizzard shad.....		200	3,600	16,300	11,600	51,250
Haddock.....	22,815	21,360	59,800	28,070	23,780	372,075
Hake.....					3,100	4,900
Halibut.....	5,600	5,800	7,400	3,000	3,800	105,736
Hickory shad or "jacks".....						23,775
Hogfish.....	200	1,600				1,800
King whiting or "kingfish".....		300		900	600	17,000
Mackerel.....	21,300	16,300	21,600	27,600	29,200	243,204
Mullet.....	1,700	9,200	6,200	12,000	3,200	43,500
Perch.....	1,400	2,100	5,500	7,600	4,900	168,700
Pike or pickerel.....	800	3,000	400	900	1,600	11,000
Pollock.....				200	1,600	2,600
Pompano.....	600					600
Salmon.....	3,800	3,300	5,800	5,200	1,600	43,400
Scup or porgy.....	1,400	1,100		17,900	15,200	145,500
Sea bass.....	21,300	4,000	4,600	12,900	11,100	364,502
Shad.....						1,748,690
Sheepshead.....	100	100			300	500
Smelt.....				75	1,050	12,825
Snapper, red.....	200		400	600	700	6,300
Spot.....	8,500	14,600	38,400	14,400	600	111,700
Squeteagues or "sea trout".....	224,400	178,900	189,000	143,600	97,800	1,823,800
Striped bass.....	1,400	5,400	13,500	41,100	17,700	167,200
Surgeon.....			75	50		950
Swordfish.....	1,100	400		200		2,975
Tilefish.....		200		400	100	1,100
Whitefish.....	1,700	3,000		1,100	600	9,500
Whiting.....					9,200	9,700
Crabs:						
Hard.....	53,550	15,150	6,000			277,950
Soft.....	14,445	19,530	7,110	135		97,605
Oyster.....					5	5
Meat.....	30,830	18,990	13,160	6,485	4,335	183,560
Sea crawfish or "spiny lobster":						
Alive.....	150	100	100	200	200	800
Meat.....	50	125		60	100	335
Lobsters:						
Alive.....	480	400	300	520	2,850	10,500
Meat.....	10	175	75	60	225	790
Shrimp.....	9,000	7,125	4,875	6,375	5,875	87,750
Squid.....				1,500	700	6,600
Clams.....	7,200	6,976	4,768	4,416	4,128	170,080
Oysters:						
In the shell (meat).....		8,974	82,026	51,037	34,475	239,522
Opened (meat).....		12,276	64,899	85,838	93,879	246,185
Scallops.....	2,520	616	680	1,536	1,616	13,488
Frogs.....	72	6				87
Terrapin.....					64	64
Turtles.....	40	540		960	320	2,530
Total.....	805,362	623,443	755,268	689,317	572,802	11,434,119

<sup>1</sup> 8,760 bushels.<sup>2</sup> 56,536 bushels.<sup>3</sup> 55,564 gallons.<sup>4</sup> 1,636 bushels.

NOTE.—The clams have been converted to pounds on the basis of 8 pounds of meats to the bushel, the oysters on the basis of 7 pounds of meats to the bushel and 8¾ pounds to the gallon, and the scallops on the basis of 8 pounds of meats to the bushel.

## FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES

(South Atlantic, area XXIV; Gulf, area XXV <sup>8</sup>)

The yield of the commercial fisheries in the South Atlantic and Gulf States (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas) during 1932 amounted to 299,916,728 pounds, valued at \$6,428,385 to the fishermen, representing an increase of 4 percent in volume but a decrease of 20 percent in value as compared with the catch in the previous year. In addition there was a production of 39,741 bushels of seed oysters, valued at \$8,280. These fisheries gave employment to 21,560 fishermen.

*Fisheries of the South Atlantic and Gulf States, 1932*

## SUMMARY OF CATCH

Product	North Carolina		South Carolina		Georgia	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	82,209,976	\$689,421	593,974	\$37,531	12,097,286	\$75,911
Shellfish, etc.....	4,004,017	137,322	3,942,314	85,860	4,425,709	110,031
Total.....	86,213,993	826,743	4,536,288	123,391	16,522,995	185,942

Product	Florida		Alabama		Mississippi	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	81,108,701	\$1,569,398	1,792,434	\$62,766	1,046,866	\$22,486
Shellfish, etc.....	22,181,520	1,403,986	4,314,053	105,825	19,555,719	474,931
Total.....	103,290,221	2,973,384	6,106,487	168,591	20,602,585	497,417

Product	Louisiana		Texas		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	1,273,961	\$68,092	4,034,327	\$189,456	184,157,525	\$2,715,061
Shellfish, etc.....	47,066,364	1,112,561	10,269,507	282,808	115,759,203	3,713,324
Total.....	48,340,325	1,180,653	14,303,834	472,264	299,916,728	6,428,385

## OPERATING UNITS: BY STATES

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	758	17	86	638	139	474	154	143	2,409
On boats and shore:									
Regular.....	2,754	615	427	5,988	360	829	1,864	1,223	14,060
Casual.....	1,411	843	539	1,331	90	205	289	383	5,091
Total.....	4,923	1,475	1,052	7,957	589	1,508	2,307	1,749	21,560
Vessels:									
Motor.....	79	4	20	98	31	114	62	33	441
Net tonnage.....	1,234	59	245	2,467	299	1,507	447	388	6,646
Sail.....	53			1		15	2		71
Net tonnage.....	502			64		237	38		841
Total vessels.....	132	4	20	99	31	129	64	33	512
Total net tonnage.....	1,736	59	245	2,531	299	1,744	485	388	7,487

<sup>8</sup> These are the numbers given to these areas by the North American Council on Fishery Investigations. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in footnotes or in separate tables in this section.

*Fisheries of the South Atlantic and Gulf States, 1932—Continued*

## OPERATING UNITS: BY STATES—Continued

Item	North Caro- lina	South Caro- lina	Geor- gia	Florida	Ala- bama	Mis- sis- sipi	Louis- iana	Texas	Total
Boats:	No.	No.	No.	No.	No.	No.	No.	No.	No.
Motor.....	1,154	84	119	2,318	153	268	574	382	5,052
Other.....	1,584	773	523	2,945	151	407	996	418	7,797
Accessory boats.....	70		4	11					85
Apparatus:									
Purse seines:									
Menhaden.....	33		2	5					40
Length, yards.....	8,025		600	1,450					10,075
Other.....	1			1					2
Length, yards.....	175			400					575
Haul seines:									
Common.....	454	20	11	110	5	3	102	54	759
Length, yards.....	66,326	2,780	1,105	34,300	2,900	800	13,434	9,315	130,960
Long.....	56			76					132
Length, yards.....	58,275			59,200					117,475
Gill nets:									
Anchor.....	1,661	324	45	12					2,042
Square yards.....	908,610	154,872	10,625	9,600					1,083,707
Drift.....	227	323	158	146					854
Square yards.....	399,265	284,554	111,863	139,606					935,288
Runaround.....	188		10	2,111				47	2,363
Square yards.....	83,500	1,450	3,170	2,110,492			13,165	2,211,777	2,211,777
Stake.....	5,271		40	5	18			267	5,601
Square yards.....	561,965		10,050	1,250	2,880	39	74,845	61	650,990
Trammel nets.....				182	53	23		61	358
Square yards.....				122,469	17,365	15,775	6,985	22,071	184,665
Lines:									
Hand.....	86	180	43	1,620	149	132	167	467	2,844
Hooks.....	166	550	46	2,573	260	142	172	594	4,503
Troll.....	45			1,190	2			8	1,245
Hooks.....	45			1,485	2			8	1,540
Trot with baits or snoods.....	156	6	31	13	15	36	318	25	600
Baits or snoods.....	119,000	4,500	9,390	2,700	2,336	8,895	60,025	3,175	210,021
Trot with hooks.....	26		40	198	101		3	48	416
Hooks.....	3,200		2,840	85,005	10,370		300	6,915	108,630
Pound nets.....	1,722			13					1,735
Weirs.....	2								2
Wheels.....	21								21
Stop nets.....				7					7
Square yards.....				11,475					11,475
Fyke nets.....	801			278	6				1,085
Dip nets:									
Common.....	204			50					254
Drop.....				54		130	1,520		1,704
Cast nets.....			10	16		60	18		104
Otter trawls:									
Fish.....	2			4					6
Yards at mouth.....	41			109					150
Shrimp.....	51	28	125	376	112	255	476	251	1,674
Yards at mouth.....	1,007	560	2,510	7,135	1,465	3,154	5,942	3,634	25,407
Pots:									
Crab.....			12	1,433					1,445
Eel.....	1,285			40					1,325
Fish.....	465		81	1,515					2,061
Sea crawfish.....				3,190					3,190
Spears.....	50	6		27	30	63		152	328
Dredges:									
Clam.....				1					1
Oyster.....	182			2		328	26	39	577
Yards at mouth.....	182			2		329	26	38	577
Scallop.....	64								64
Yards at mouth.....	64								64
Tongs.....	387	6	120	413	142	245	465	222	2,000
Rakes.....	483		4						487
Forks.....				40					40
Grabs.....		333	60						393
Coquina scoops.....				3					3
Hooks, sponge.....				201					201
Diving apparatus.....				54					54

## Fisheries of the South Atlantic and Gulf States, 1932—Continued

## CATCH: BY STATES

Species	North Carolina		South Carolina		Georgia	
	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>						
Alewives.....	6,584,000	\$41,899				
Black bass.....	31,800	3,180				
Bluefish.....	686,597	16,409	4,062	\$325		
Bowfin.....	1,700	17				
Butterfish.....	54,514	786				
Carp.....	128,400	6,640				
Catfish and bullheads.....	524,904	9,600			98,389	\$5,841
Cero.....	13,000	520				
Croaker.....	4,540,356	46,642			8,226	329
Drum, red or redfish.....	87,200	1,744	3,170	108	2,141	107
Eels.....	56,715	1,877			550	22
Flounders.....	789,767	32,797	5,175	284	2,904	88
Gizzard shad.....	19,200	161				
Grunts.....			6,300	220		
Hake.....	1,624	22				
Harvestfish or "starfish".....	1,077,381	11,858				
Hickory shad.....	117,325	4,055	11,066	886	9,841	707
Hogfish.....	992	12				
King whiting or "kingfish".....	300,048	4,033	16,210	610	19,746	617
Menhaden.....	54,476,000	75,135			11,520,000	16,000
Mullet.....	2,472,050	51,655	148,050	6,042	52,627	1,904
Pigfish.....	62,200	627				
Pike or pickerel.....	5,200	393				
Pinfish or sailors choice.....	270,000	1,012				
Pompano.....	150	22				
Scup.....	5,615	172				
Sea bass.....	202,495	6,251	218,750	8,187	32,000	960
Shad.....	924,994	125,026	123,036	15,459	288,145	45,111
Sharks.....			8,000	80		
Sheepshead.....	2,650	53				
Spanish mackerel.....	77,900	3,600				
Spot.....	1,587,555	17,821	10,000	400	9,542	351
Squeteagues or "sea trout":						
Gray.....	3,636,323	64,097	2,460	148	2,000	120
Spotted.....	1,895,700	78,363	14,355	1,048	46,210	3,357
Striped bass.....	506,760	54,516				
Sturgeon.....	1,661	179	23,340	3,734	4,965	397
Suckers.....	450	9				
Sunfish.....	55,250	1,105				
White perch.....	831,600	21,302				
Yellow perch.....	179,900	4,871				
<b>Total.....</b>	<b>82,209,976</b>	<b>689,421</b>	<b>59,974</b>	<b>34,591</b>	<b>12,097,286</b>	<b>75,911</b>
<b>SHELLFISH, ETC.</b>						
<b>Crabs:</b>						
Hard.....	1,847,600	18,448	10,000	320	225,492	3,383
Soft.....	308,558	5,921				
<b>Shrimp.....</b>	<b>292,104</b>	<b>9,393</b>	<b>1,500,667</b>	<b>32,529</b>	<b>3,601,564</b>	<b>89,547</b>
<b>Clams, hard, public.....</b>	<b>260,624</b>	<b>17,278</b>	<b>4,800</b>	<b>60</b>	<b>0</b>	<b>75</b>
<b>Oysters:</b>						
Market, public, spring.....	626,492	25,057	1,505,886	21,009		
Market, public, fall.....	563,478	26,613	476,004	10,175		
Market, private, spring.....	10,216	539	429,400	9,645	413,121	8,789
Market, private, fall.....	1,200	100	566,751	10,466	176,287	6,881
<b>Scallops, bay.....</b>	<b>91,438</b>	<b>6,500</b>				
<b>Octopus.....</b>			<b>1,200</b>	<b>72</b>		
<b>Squid.....</b>	<b>769</b>	<b>13</b>				
<b>Terrapin, diamond-back.....</b>	<b>1,507</b>	<b>30</b>	<b>1,500</b>	<b>483</b>	<b>0</b>	<b>1,356</b>
<b>Total.....</b>	<b>4,003,617</b>	<b>167,822</b>	<b>2,534,601</b>	<b>60,826</b>	<b>4,411,066</b>	<b>110,031</b>
<b>Grand total.....</b>	<b>86,213,593</b>	<b>856,743</b>	<b>62,508,575</b>	<b>123,391</b>	<b>16,508,352</b>	<b>185,942</b>

Species	Florida		Alabama		Mississippi	
	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>						
Alewives.....	79,147	\$427				
Amberjack.....	4,574	122				
Barracuda.....	4,245	180				
Black bass.....	78,807	18,518				
Bluefish.....	1,411,703	60,634	12,401	\$563	4,700	\$86
Blue runner or redfish.....	152,700	2,311	904	17		
Butterfish.....			11,829	303		
Caho or crab eater.....	5,134	103	500	15		
Catfish and bullheads.....	2,531,600	11,234	60,211	2,736	27,115	453
Cero.....	27	4				
Croaker.....	9,700	170				
Cutfish.....	2,000	40				
Crappie.....	424,926	11,266				

See foot notes at end of table.

## Fisheries of the South Atlantic and Gulf States, 1932—Continued

## CATCH: BY STATES—Continued

Species	Florida		Alabama		Mississippi	
FISH—continued	Pounds	Value	Pounds	Value	Pounds	Value
Crevaille.....	22, 751	\$518	259	\$5	990	\$9
Croaker.....	25, 775	431	18, 111	330	10, 835	191
Dolphin.....	12, 050	361				
Drum:						
Black.....	48, 010	817	742	14	8, 937	115
Red or redfish.....	764, 784	11, 894	44, 292	2, 645	75, 100	2, 062
Eels.....	7, 560	153				
Flounders.....	455, 131	12, 365	21, 490	1, 668	46, 540	2, 129
Frigate mackerel.....	2, 250	90				
Groupers.....	3, 163, 878	64, 600	99, 746	1, 998	16, 117	322
Grunts.....	44, 391	1, 297				
Hake.....	8, 218	165				
Hickory shad.....	28, 147	507				
Hogfish.....	28, 430	853				
Jewish fish.....	30, 290	1, 034				
Kingfish or "king mackerel".....	3, 294, 501	119, 544	880	40		
King whiting or "kingfish".....	285, 059	6, 880	3, 718	68	2, 728	45
Ladyfish.....	2, 622	39				
Menhaden.....	23, 349, 860	41, 220				
Mojarro.....	35, 589	514				
Mullet.....	21, 141, 449	338, 254	696, 958	10, 673	564, 970	8, 235
Muttonfish.....	203, 135	8, 811				
Paddlefish or spoonbill cat.....			1, 320	60		
Permit.....	2, 850	107				
Pigfish.....	66, 548	948				
Pinfish or sailors choice.....	24, 975	485				
Pompano.....	581, 263	80, 087	3, 144	436	132	12
Porgies.....	25, 786	512				
Porkfish.....	363	7				
Scup.....	247, 792	5, 936				
Sea bass.....	250, 995	8, 102				
Shad.....	546, 086	52, 940				
Sharks.....	5, 043, 000	12, 005				
Sheepshead.....	535, 330	8, 456	4, 441	120	23, 815	539
Snapper:						
Mangrove.....	95, 580	2, 407				
Red.....	4, 588, 265	228, 536	681, 573	30, 263	36, 812	1, 841
Snook or sergeantfish.....	301, 780	6, 936				
Spanish mackerel.....	6, 337, 598	209, 836	8, 028	292		
Spot.....	68, 360	925	401	7		
Squeteagues or "sea trout":						
Gray.....	21, 418	676	6, 050	110	103, 015	1, 873
Spotted.....	2, 666, 525	106, 425	103, 224	9, 392	124, 394	4, 524
Sturgeon.....	4, 379	199	10, 742	977		
Sunfish.....	662, 494	16, 831				
Tenpounder.....	77, 845	1, 349	1, 400	14	350	4
Tripletail.....	890	18			176	4
Tuna or "horse mackerel".....	3, 350	134				
Turbot.....	4, 125	124				
Yellowtail.....	91, 870	4, 441				
Total.....	81, 108, 701	1, 569, 398	1, 792, 434	62, 766	1, 046, 866	22, 486
SHELLFISH, ETC.						
Crabs:						
Hard <sup>1</sup> .....	82, 182	3, 519	70, 070	982	320, 107	4, 665
Soft.....			1, 280	236	3, 572	893
Stone.....	153, 825	8, 335				
Sea crawfish or spiny lobster.....	445, 547	32, 078				
Shrimp.....	18, 136, 334	535, 198	3, 381, 700	71, 910	14, 009, 720	267, 428
Clams:						
Coquina.....	5, 400	335				
Hard, public <sup>2</sup> .....	1, 120, 812	42, 742				
Conchs.....	1, 500	120				
Oysters: <sup>3</sup>						
Market, public, spring.....	542, 438	27, 493	748, 952	27, 216	4, 472, 358	169, 783
Market, public, fall.....	659, 715	35, 668	88, 485	3, 892	749, 962	32, 162
Market, private, spring.....	186, 558	7, 886	3, 960	220		
Market, private, fall.....	113, 495	6, 320	17, 820	990		
Scallops, bay.....	61, 965	6, 885				
Squid.....	7, 553	147				
Frogs.....			697	104		
Terrapin, diamond-back.....			1, 089	275		
Turtles, soft-shell.....	51, 669	336				
Sponges:						
Grass.....	181, 367	37, 319				
Sheepswood.....	277, 087	593, 674				
Velvet.....	71	20				
Wire.....	29, 466	13, 387				
Yellow.....	124, 536	52, 524				
Total.....	22, 181, 520	1, 403, 986	4, 314, 053	105, 825	19, 555, 719	474, 931
Grand total.....	103, 290, 221	2, 973, 384	6, 106, 487	168, 591	20, 602, 585	497, 417

See footnotes at end of table.



## Fisheries of the South Atlantic and Gulf States, 1932—Continued

## CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>						
Alewives.....					6,663,947	\$42,336
Amberjack.....					4,577	122
Barracuda.....					4,245	180
Black bass.....					310,277	21,698
Bluefish.....			1,760	\$80	2,130,783	78,077
Blue runner or hardtail.....					163,431	2,328
Bowfin.....					1,700	17
Buffalofish.....					11,829	323
Butterfish.....					55,511	833
Cabio or crab eater.....					5,805	120
Carp.....					128,400	6,640
Catfish and bullheads.....	44,850	\$1,583	76,825	2,752	4,363,930	139,219
Cero.....					13,275	524
Cigarfish.....					9,350	170
Cod.....					2,039	43
Crappie.....					404,926	11,866
Crevalle.....	300	9			24,300	541
Croaker.....	44,470	1,924	27,025	576	4,674,798	50,423
Dolphin.....					12,050	361
Drum:						
Black.....	87,412	2,701	932,091	17,153	1,077,192	20,803
Red or redfish.....	281,739	14,493	824,819	45,322	2,083,245	78,375
Eels.....					64,825	2,052
Flounders.....	4,405	314	70,515	4,614	1,395,927	54,259
Frigate mackerel.....					2,250	90
Garfish.....	300	15			300	15
Gizzard shad.....					19,200	161
Groupers.....	3,400	68	18,301	380	3,301,442	67,368
Grunts.....					50,691	1,517
Hake.....					9,842	187
Harvestfish or "starfish".....					1,077,381	11,858
Hickory shad.....					166,379	6,155
Hogfish.....					29,422	865
Jewfish.....	2,400	48	5,750	165	38,440	1,247
Kingfish or "king mackerel".....			5,280	162	3,300,661	119,746
King whiting or "kingfish".....	16,000	374	8,535	155	652,044	12,782
Ladyfish.....					2,622	39
Menhaden.....					89,345,860	132,355
Mojarro.....					35,589	514
Mullet.....	6,300	155	4,950	90	25,087,354	417,008
Muttonfish.....					203,135	8,811
Paddlefish or spoonbill cat.....					1,320	60
Permit.....					2,850	107
Pigfish.....					128,748	1,575
Pike or pickerel.....					5,200	393
Pinfish or sailors choice.....					294,975	1,497
Pompano.....	90	11	5,159	469	589,938	81,037
Porgies.....					25,786	512
Porkfish.....					363	7
Scup.....					253,407	6,108
Sea bass.....					704,240	23,500
Shad.....					1,882,261	239,436
Sharks.....					5,051,000	12,085
Sheepshead.....	77,673	4,019	29,154	599	673,063	13,786
Snapper:						
Mangrove.....					95,580	2,407
Red.....	66,884	4,013	985,291	50,076	6,358,825	314,729
Snook or sergeantfish.....			20,893	569	322,673	7,505
Spanish mackerel.....	400	16	41,140	2,616	6,465,066	216,420
Spot.....	3,450	87			1,679,308	19,591
Squeteagues or "sea trout":						
Gray.....	220,471	6,603			3,991,737	73,627
Spotted.....	412,427	31,607	976,344	63,660	6,239,179	298,376
Striped bass.....			495	18	507,255	54,534
Sturgeon.....					45,087	5,486
Suckers.....					450	9
Sunfish.....					717,744	17,936
Tenpounder.....					79,595	1,367
Tripletail.....	990	49			2,056	71
Tuna or "horse mackerel".....					3,350	134
Turbot.....					4,125	124
White perch.....					831,600	21,302
Yellow perch.....					179,900	4,871
Yellowtail.....					91,870	4,441
Total.....	1,273,961	68,092	4,034,327	189,456	184,157,525	2,715,061

*Fisheries of the South Atlantic and Gulf States, 1932—Continued*

## CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
SHELLFISH, ETC.	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:						
Hard <sup>1</sup> .....	5, 877, 737	\$56, 776	44, 660	\$669	8, 483, 848	\$88, 762
Soft.....	99, 340	25, 258			412, 747	60, 308
Stone.....					153, 825	8, 335
Sea crawfish or spiny lobster.....					445, 547	32, 078
Shrimp.....	38, 095, 780	800, 452	9, 244, 246	229, 529	88, 262, 135	2, 035, 986
Clams:						
Coquina.....					5, 400	335
Hard, public <sup>2</sup> .....					1, 386, 836	60, 695
Conchs.....					1, 500	120
Oysters: <sup>3</sup>						
Market, public, spring.....	267, 672	16, 054	442, 932	25, 591	8, 306, 700	312, 773
Market, public, fall.....			537, 669	27, 019	3, 075, 013	134, 529
Market, private, spring.....	1, 164, 853	92, 616			2, 208, 168	119, 716
Market, private, fall.....	1, 545, 536	119, 657			2, 160, 129	144, 414
Scallops, bay.....					153, 423	13, 445
Octopus.....					1, 200	72
Squid.....					8, 316	160
Frogs.....					697	104
Terrapin, diamond-back.....	8, 996	1, 619			23, 073	4, 103
Turtles:						
Loggerhead.....	6, 450	129			6, 450	129
Soft-shell.....					51, 669	336
Sponges:						
Grass.....					181, 367	37, 319
Sheepswool.....					277, 087	593, 674
Velvet.....					71	20
Wire.....					29, 466	13, 387
Yellow.....					124, 536	52, 524
Total.....	47, 066, 364	1, 112, 561	10, 269, 507	282, 808	115, 759, 203	3, 713, 324
Grand total.....	48, 340, 325	1, 180, 653	14, 303, 834	472, 264	299, 916, 728	6, 428, 385

<sup>1</sup> Statistics on hard crabs used in this table are based on yields of 3 pounds per dozen in North Carolina; 6 pounds in South Carolina and Georgia; 7.32 pounds in Florida; 6.25 pounds in Mississippi; 6.98 pounds in Alabama and Texas; and 6.45 pounds in Louisiana.

<sup>2</sup> Statistics on hard clams used in this table are based on yields of 8 pounds of meats per bushel in all States.

<sup>3</sup> Statistics on market oysters used in this table are based on yield of 5.71 pounds of meats per bushel in North Carolina; 4.76 in South Carolina; 5.69 in Georgia; 3.29 in Florida; 2.40 in Alabama; 2.19 in Mississippi; 4.14 in Louisiana; and 5.05 in Texas.

NOTE.—Of the total catch in North Carolina, 569,170 pounds of fishery products, valued at \$5,925, were taken in the winter trawl fishery off Maryland, Virginia, and North Carolina. Of the total catch in Florida, 942,791 pounds of fishery products, valued at \$8,607, were taken in the same fishery. These products consisted principally of sea breams, pompanos, croaker, and gray snout. The seed oyster fishery was prosecuted in this section only in North Carolina where 12 regular fishermen using 6 motor boats and 12 dredges took 59,741 bushels of seed oysters, valued at \$8,280, from public beds. None of these fishermen, craft, or gear was duplicated among those in the fisheries for market oysters or other species.

## PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	North Carolina		South Carolina		Georgia	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number.....	7, 390, 499	\$18, 443	32, 000	\$320	450, 984	\$3, 383
Soft.....do.....	1, 120, 054	33, 921				
Clams, hard, public.....bushels.....	22, 571	17, 253	600	600	75	75
Oysters:						
Market, public, spring.....do.....	109, 713	25, 047	273, 337	21, 569		
Market, public, fall.....do.....	91, 613	25, 613	90, 938	10, 175		
Market, private, spring.....do.....	1, 789	579	90, 223	9, 646	72, 605	8, 789
Market, private, fall.....do.....	119	100	64, 452	10, 466	30, 606	6, 581
Scallops, bay.....do.....	13, 629	6, 569				

*Fisheries of the South Atlantic and Gulf States, 1932—Continued*

## PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS—Continued.

Product	Florida		Alabama		Mississippi	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number	134, 778	\$3, 519	120, 520	\$982	614, 605	\$4, 665
Soft.....do			3, 840	236	10, 716	893
Clams, hard, public.....bushels	140, 101	42, 742				
Oysters:						
Market, public, spring.....do	164, 875	27, 493	312, 063	27, 216	2, 042, 173	169, 783
Market, public, fall.....do	200, 521	35, 668	36, 869	3, 892	342, 448	32, 162
Market, private, spring.....do	56, 705	7, 886	1, 650	220		
Market, private, fall.....do	34, 497	6, 320	7, 425	990		
Scallops, bay.....do	11, 692	6, 885				

  

Product	Louisiana		Texas		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number	10, 932, 591	\$56, 776	76, 815	\$669	19, 752, 693	\$58, 762
Soft.....do	298, 020	25, 258			1, 432, 630	60, 308
Clams, hard, public.....bushels					173, 354	60, 695
Oysters:						
Market, public, spring.....do	64, 655	16, 054	87, 709	25, 591	3, 034, 525	312, 773
Market, public, fall.....do			106, 469	27, 019	884, 928	134, 52
Market, private, spring.....do	281, 365	92, 616			504, 337	119, 716
Market, private, fall.....do	373, 318	119, 657			510, 708	144, 414
Scallops, bay.....do					28, 321	13, 445

## NORTH CAROLINA

*Fisheries of North Carolina, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines		Gill nets			
	Men-haden	Other	Com-mon	Long	Anchor	Drift	Run-around	Stake
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	418		60	120	46	21		
On boats and shore:								
Regular.....	48	7	925	147	298	274	119	281
Casual.....			311	62	72	32	100	86
Total.....	466	7	1, 296	329	416	327	219	367
Vessels:								
Motor.....	27		11	37	15	5		
Net tonnage.....	884		67	257	91	28		
Boats:								
Motor.....	6	1	221	54	160	89	59	184
Other.....	10	2	398	47	100	51	103	109
Accessory boats.....	50		3	17				
Apparatus:								
Number.....	33	1	454	56	1, 661	227	188	5, 271
Length, yards.....	8, 025	175	66, 326	58, 275				
Square yards.....					908, 610	399, 265	83, 500	561, 965

*Fisheries of North Carolina, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Lines				Pound nets	Weirs	Wheels
	Hand	Troll	Trot with baits or snoods	Trot with books			
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	17						
On boats and shore:							
Regular.....	20	70	105	6	468		8
Casual.....	40	10	74	16	211	1	
<b>Total</b> .....	77	80	179	22	679	1	8
<b>Vessels:</b>							
Motor.....	6						
Net tonnage.....	41						
<b>Boats:</b>							
Motor.....	30	35	86	2	215	1	8
Other.....			58	11	216		10
<b>Apparatus:</b>							
Number.....	86	45	156	26	1,722	2	21
Hooks, baits or snoods.....	166	45	119,000	3,200			

Item	Fyke nets	Dip nets	Otter trawls		Pots		Spears
			Fish	Shrimp	Eel	Fish	
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			6	14			
On boats and shore:							
Regular.....	43	184		90	24	12	20
Casual.....	12	20			9	14	30
<b>Total</b> .....	55	204	6	104	33	26	50
<b>Vessels:</b>							
Motor.....			2	6			
Net tonnage.....			32	36			
<b>Boats:</b>							
Motor.....	34	10		45	4		
Other.....	24	127			28	19	45
<b>Apparatus:</b>							
Number.....	801	204	2	51	1,285	465	50
Yards at mouth.....			41	1,007			

Item	Dredges		Tongs	Rakes	By hand	Total, exclusive of dupli- cation
	Oyster	Scallop				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	156					758
On boats and shore:						
Regular.....	56	68	154	198	40	2,754
Casual.....	20		238	285	20	1,411
<b>Total</b> .....	232	68	392	483	60	4,923
<b>Vessels:</b>						
Motor.....						79
Net tonnage.....						1,234
Sail.....	53					53
Net tonnage.....	502					502
<b>Total vessels</b> .....	53					132
<b>Total net tonnage</b> .....	502					1,736
<b>Boats:</b>						
Motor.....	38	34	67	10		1,154
Other.....			262	415	40	1,584
<b>Accessory boats</b> .....						70
<b>Apparatus:</b>						
Number.....	182	64	387	483		
Yards at mouth.....	182	64				

## Fisheries of North Carolina, 1933—Continued

## CATCH: BY GEAR

Species	Purse seines				Haul seines			
	Menhaden		Other		Common		Long	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	781,400	\$6,878			550,100		\$4,752	
Black bass.....	26,564	2,656			468		47	
Bluefish.....	151,900	3,513			90,500		2,410	
Bowfin.....	1,200	12						
Butterfish.....	24,750	445			5,000		50	
Carp.....	66,000	3,625			19,000		1,190	
Catfish and bullheads.....	237,000	3,800			126,504		2,017	
Croaker.....	527,000	5,256			2,202,000		22,020	
Drum, red or redfish.....	31,200	624			15,000		300	
Eels.....					200		5	
Flounders.....	140,850	6,078			16,300		200	
Gizzard shad.....	3,000	25			5,700		31	
Harvestfish or "starfish".....	87,400	879			10,000		100	
Hickory shad.....	16,000	480						
King whiting or "kingfish".....	166,700	2,289			50,000		500	
Menhaden.....	54,378,200	\$75,061						
Mullet.....					97,800		74	
Pigfish.....	1,712,550	33,625			200		8	
Pike or pickerel.....	12,000	125			50,000		500	
Pinfish or sailors choice.....	4,000	320						
Pompano.....	30,000	150			150,000		750	
Sea bass.....	150	22						
Shad.....	30,000	1,200						
Sheepshead.....	19,000	2,580			36,400		4,550	
Spanish mackerel.....	400	8						
Spot.....	24,900	1,295						
Squeteagues or "sea trout":.....	770,200	9,132			422,000		4,220	
Gray.....								
Spotted.....	253,400	4,558			337,000		5,540	
Striped bass.....	607,000	24,970			1,111,000		45,940	
Sturgeon.....	94,200	8,850			142,400		11,998	
Sunfish.....	600	60						
White perch.....	34,100	682			16,000		320	
Yellow perch.....	297,500	7,334			165,000		4,575	
Crabs, soft.....	106,500	2,987			29,250		855	
Terrapin, diamond-back.....	195,591	21,497						
	557	120						
Total.....	54,468,200	75,173	75,000	11,250	6,551,412	156,149	5,550,022	112,878

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	140,500	\$1,282	110,000	\$500	1,000	\$5	126,000	\$1,460
Bluefish.....	4,000	80	78,406	2,840	25,000	500	314,000	6,280
Butterfish.....	1,250	18					1,000	20
Croaker.....	377,000	3,820	350,000	3,500	11,500	115	29,000	340
Drum, red or redfish.....	2,500	50					500	10
Eels.....	150	3						
Flounders.....	400	12			500	10		
Gizzard shad.....	3,000	30						
Harvestfish or "starfish".....	2,000	20						
Hickory shad.....	22,900	837					10,000	250
King whiting or "kingfish".....	47,000	665						
Mullet.....	53,500	1,070	95,000	2,200	429,500	10,585	176,500	3,980
Pigfish.....							200	2
Sea bass.....	20,000	600			10,000	300		
Shad.....	242,000	29,190	66,269	7,952			160,300	25,761
Spanish mackerel.....	500	15						
Spot.....	95,800	958	10,000	250	40,500	745	57,555	576
Squeteagues or "sea trout":.....								
Gray.....	209,000	6,070	206,000	8,120	2,000	80	115,500	2,110
Spotted.....			30,000	1,355	2,500	130	120,000	4,860
Striped bass.....	71,000	8,475					16,200	1,532
Sturgeon.....			800	80				
White perch.....	14,000	440						
Total.....	1,306,500	53,635	916,475	27,097	522,500	12,470	1,126,755	47,181

*Fisheries of North Carolina, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines							
	Hand		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....	5,700	\$264	3,500	\$70	-----	-----	18,000	\$520
Catfish and bullheads.....	-----	-----	13,000	520	-----	-----	-----	-----
Cero.....	-----	-----	-----	-----	-----	-----	-----	-----
Sea bass.....	100,600	3,080	-----	-----	-----	-----	-----	-----
Spanish mackerel.....	1,000	40	39,000	1,560	-----	-----	-----	-----
Striped bass.....	-----	-----	-----	-----	-----	-----	11,760	1,171
Crabs, hard.....	-----	-----	-----	-----	1,847,600	\$18,448	-----	-----
Total.....	107,300	3,384	55,500	2,150	1,847,600	18,448	29,760	1,691

Species	Pound nets		Weirs		Wheels		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	4,591,000	\$25,052	-----	-----	263,000	\$1,505	21,000	\$185
Black bass.....	-----	-----	-----	-----	-----	-----	4,768	477
Bluefish.....	13,500	445	-----	-----	-----	-----	500	5
Bowfin.....	-----	-----	-----	-----	-----	-----	-----	-----
Butterfish.....	21,500	230	-----	-----	-----	-----	-----	-----
Carp.....	13,300	244	2,000	\$20	-----	-----	28,100	1,561
Catfish and bullheads.....	45,500	1,215	-----	-----	-----	-----	97,900	2,048
Croaker.....	892,000	8,920	-----	-----	-----	-----	-----	-----
Drum, red or redfish.....	38,000	760	-----	-----	-----	-----	-----	-----
Eels.....	2,500	100	-----	-----	-----	-----	2,200	48
Flounders.....	527,600	23,220	-----	-----	-----	-----	5,800	229
Gizzard shad.....	4,500	45	-----	-----	-----	-----	3,000	30
Harvestfish or "starfish".....	977,981	10,859	-----	-----	-----	-----	-----	-----
Hickory shad.....	68,425	2,488	-----	-----	-----	-----	-----	-----
King whiting or "kingfish".....	4,500	90	-----	-----	-----	-----	-----	-----
Mullet.....	4,500	175	-----	-----	-----	-----	300	12
Pike or pickerel.....	-----	-----	-----	-----	-----	-----	1,200	73
Shad.....	400,525	55,833	-----	-----	-----	-----	500	60
Sheepshead.....	2,250	45	-----	-----	-----	-----	-----	-----
Spanish mackerel.....	12,500	750	-----	-----	-----	-----	-----	-----
Spot.....	191,500	1,940	-----	-----	-----	-----	-----	-----
Squeteagues or "sea trout":	-----	-----	-----	-----	-----	-----	-----	-----
Gray.....	2,503,000	37,310	-----	-----	-----	-----	-----	-----
Spotted.....	25,200	1,108	-----	-----	-----	-----	21,000	2,125
Striped bass.....	75,200	9,115	-----	-----	-----	-----	150	3
Suckers.....	300	6	-----	-----	-----	-----	5,150	103
Sunfish.....	-----	-----	-----	-----	-----	-----	45,000	1,165
White perch.....	92,600	3,438	-----	-----	-----	-----	39,750	897
Yellow perch.....	4,400	132	-----	-----	-----	-----	-----	-----
Total.....	10,512,281	183,520	2,000	20	263,000	1,505	276,318	9,001

Species	Dip nets		Otter trawls				Pots	
			Fish		Shrimp		Eel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....	-----	-----	91	\$7	-----	-----	-----	-----
Butterfish.....	-----	-----	1,014	23	-----	-----	-----	-----
Croaker.....	-----	-----	151,856	2,671	-----	-----	51,228	\$1,712
Eels.....	-----	-----	437	9	-----	-----	-----	-----
Flounders.....	-----	-----	51,317	1,538	24,000	\$520	-----	-----
Hake.....	-----	-----	1,624	22	-----	-----	-----	-----
Hogfish.....	-----	-----	992	12	-----	-----	-----	-----
King whiting or "kingfish".....	-----	-----	1,848	39	30,000	450	-----	-----
Scup.....	-----	-----	5,615	172	-----	-----	-----	-----
Sea bass.....	-----	-----	41,895	1,071	-----	-----	-----	-----
Squeteagues or "sea trout", gray.....	-----	-----	10,423	309	-----	-----	-----	-----
Sturgeon.....	-----	-----	261	39	-----	-----	-----	-----
Crabs, soft.....	112,964	\$12,424	-----	-----	292,104	9,393	-----	-----
Shrimp.....	-----	-----	-----	-----	-----	-----	-----	-----
Squid.....	-----	-----	763	13	-----	-----	-----	-----
Total.....	112,964	12,424	268,136	5,925	346,104	10,363	51,228	1,712

*Fisheries of North Carolina, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Pots—Contd.		Spears		Dredges			
	Fish				Oyster		Scallop	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Flounders.....	217, 500	\$4, 350	23, 000	\$990				
White perch.....								
Oysters:								
Market, public, spring.....					312, 202	\$11, 309		
Market, public, fall.....					275, 952	11, 289		
Market, private, spring.....					2, 000	100		
Scallops, bay.....							27, 006	\$1, 800
Terrapin, diamond-back.....	1, 000	250						
Total.....	218, 500	4, 600	23, 000	990	590, 754	22, 698	27, 006	1, 800

Species	Tongs		Rakes		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Clams, hard, public.....	3, 200	\$200	247, 424	\$16, 078	10, 000	\$1, 000
Oysters:	-----	-----	-----	-----	-----	-----
Market, public, spring.....	283, 756	12, 233	-----	-----	30, 504	1, 525
Market, public, fall.....	267, 382	13, 317	-----	-----	20, 144	1, 007
Market, private, spring.....	7, 616	459	-----	-----	-----	-----
Market, private, fall.....	1, 200	100	-----	-----	-----	-----
Scallops, bay.....	-----	-----	64, 452	4, 760	-----	-----
Total.....	563, 154	26, 309	311, 876	20, 838	60, 648	3, 532

## SEED OYSTER FISHERY: BY GEAR

Item		Oyster dredges	
OPERATING UNITS		Number	
Fishermen: On boats and shore—Regular.....		12	
Boats: Motor.....		6	
Apparatus: Number.....		12	
Yards at mouth.....		12	
CATCH		<i>Bushels</i>	<i>Value</i>
Oysters, seed, public, spring.....		39, 741	\$8, 250

NOTE.—Of the persons and gear employed in the seed oyster fishery all are duplicated among those in the market oyster fishery or fisheries for other species.

## SOUTH CAROLINA

*Fisheries of South Carolina, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines	
		Anchor	Drift	Run-around	Hand	Trot with baits or snoods
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....					10	
On boats and shore:						
Regular.....	10	28	60	12	140	6
Casual.....	138	152	586		30	
Total.....	148	180	646	12	180	6
Vessels, motor.....					2	
Net tonnage.....					20	
Boats:						
Motor.....		22	15	3	14	
Other.....	20	122	308		58	6
Apparatus:						
Number.....	20	324	323	7	180	6
Length, yards.....	2,780					
Square yards.....		154,872	284,554	1,450		
Hooks, baits, or snoods.....					550	4,500

Item	Otter trawls	Spears	Tongs	Grabs	By hand	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	7					17
On boats and shore:						
Regular.....	52	6		323	30	615
Casual.....			6	10	10	843
Total.....	59	6	6	333	40	1,475
Vessels, motor.....	2					4
Net tonnage.....	39					59
Boats:						
Motor.....	26			7		84
Other.....		6	3	311	36	773
Apparatus:						
Number.....	28	6	6	333		
Yards at mouth.....	560					

## CATCH: BY GEAR

Species	Haul seines		Gill nets					
			Anchor		Drift		Runaround	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Drum, red or redfish.....	3,170	\$108						
Flounders.....	1,575	79						
Hickory shad.....			5,172	\$414	5,894	\$472		
King whiting or "kingfish".....	3,810	190					2,000	\$100
Mullet.....	134,050	5,512					14,000	530
Shad.....			61,541	7,670	61,495	7,789		
Spot.....	8,000	320					2,000	80
Squeteagues or "sea trout":								
Gray.....	960	58						
Spotted.....	1,855	148						
Sturgeon.....			19,590	3,134	3,750	600		
Terrapin, diamond-back.....	712	182						
Total.....	154,132	6,597	86,303	11,218	71,139	8,861	18,000	710



*Fisheries of South Carolina, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines				Otter trawls		Spears	
	Hand		Trot with baits or snoods					
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bluefish.....	4,062	\$325						
Flounders.....	850	48			750	\$37	2,000	\$120
Grunts.....	6,300	220						
King whiting or "kingfish".....	5,400	195			5,000	125		
Sea bass.....	218,750	8,187						
Sharks.....	8,000	80						
Squeteagues or "sea trout":								
Gray.....	1,500	90						
Spotted.....	12,500	900						
Crabs, hard.....			16,000	\$320				
Shrimp.....					1,500,687	32,529		
Octopus.....	1,200	72						
Total.....	258,562	10,117	16,000	320	1,506,437	32,691	2,000	120

Species	Tongs		Grabs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams, hard, public.....					4,800	\$600
Oysters:						
Market, public, spring.....			1,205,281	\$21,547	605	22
Market, public, fall.....			475,299	10,157	405	18
Market, private, spring.....	22,808	\$702	404,852	8,884	1,800	60
Market, private, fall.....	6,669	296	298,962	10,112	1,160	58
Terrapin, diamond-back.....					1,074	301
Total.....	29,477	998	2,384,394	50,700	9,844	1,059

## GEORGIA

*Fisheries of Georgia, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines, men-haden	Haul seines	Gill nets				Lines		
			Anchor	Drift	Run-around	Stake	Hand	Trot with baits or snoods	Trot with hooks
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	50								
On boats and shore:									
Regular.....					18	4	3	30	
Casual.....		28	50	316		40	40	1	40
Total.....	50	28	50	316	18	44	43	31	40
Vessels, motor.....	2								
Net tonnage.....	108								
Boats:									
Motor.....				3	10		1		
Other.....		14	45	158	8	20	10	31	40
Accessory boats.....	4								
Apparatus:									
Number.....	2	11	45	158	10	40	43	31	40
Length, yards.....	600	1,105							
Square yards.....			10,625	111,863	3,170	10,050			
Hooks, baits, or snoods.....							46	9,390	2,840

## Fisheries of Georgia, 1932—Continued

## OPERATING UNITS: BY GEAR—Continued

Item	Cast nets	Otter trawls	Pots		Tongs	Rakes	Grabs	By hand	Total, exclu- sive of dupli- cation
			Crab	Fish					
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....		36							86
On boats and shore:									
Regular.....	4	214	12		84		60	62	427
Casual.....	6			22	42	4		36	539
Total.....	10	250	12	22	126	4	60	98	1,052
Vessels, motor.....		18							20
Net tonnage.....		137							245
Boats:									
Motor.....		107							119
Other.....	4		12	11	111	4	60	92	523
Accessory boats.....									4
Apparatus:									
Number.....	10	125	12	81	120	4	60		
Yards at mouth.....		2,510							

## CATCH: BY GEAR

Species	Purse seines, menhaden		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Hickory shad.....					791	\$47	6,899	\$488
Menhaden.....	11,520,000	\$16,000						
Shad.....					45,708	6,969	229,972	36,272
Squeteagues or "sea trout":								
Gray.....					2,000	120		
Spotted.....					16,000	1,120		
Sturgeon.....							4,965	397
Terrapin, diamond-back.....			9,645	\$1,356				
Total.....	11,520,000	16,000	9,645	1,356	64,499	8,256	241,836	37,157

Species	Gill nets—Continued				Lines			
	Runaround		Stake		Hand		Trot with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....	8,226	\$329						
Drum, red or redfish.....	2,141	107						
Eels.....							550	\$22
Flounders.....	2,455	74						
Hickory shad.....			2,151	\$172				
King whiting or "kingfish".....	8,646	284			2,142	\$64		
Mullet.....	20,165	930						
Sea bass.....					32,600	960		
Shad.....			12,465	1,870				
Spot.....	9,542	351						
Squeteagues or "sea trout" spotted.....	15,514	1,181			2,696	216		
Crabs, hard.....							170,467	2,558
Total.....	66,689	3,256	14,616	2,042	36,838	1,240	171,017	2,580

*Fisheries of Georgia, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines—Cont.		Cast nets		Otter trawls		Pots			
	Trot with hooks						Crabs		Fish	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads	29, 667	\$1, 718							68, 722	\$4, 123
Flounders					449	\$14				
King whiting or "king-fish"					8, 958	269				
Mullet			32, 462	\$974						
Squeteagues or "sea trout", spotted			12, 000	840						
Crabs, hard							55, 025	\$825		
Shrimp					3, 601, 564	89, 547				
Total	29, 667	1, 718	44, 462	1, 814	3, 610, 971	89, 830	55, 025	825	68, 722	4, 123

Species	Tongs		Rakes		Grabs		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Clams, hard, public.....			600	\$75				
Oysters:								
Market, private, spring.....	76,467	\$2,264			283,090	\$4,927	53,564	\$1,598
Market, private, fall.....	101,687	4,056			25,670	906	47,930	1,919
Total.....	178,154	6,320	600	75	308,760	5,833	101,494	3,517

## FLORIDA

*Fisheries of Florida, 1932*

### OPERATING UNITS: BY GEAR

[illegible]

*Fisheries of Florida, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Lines				Pound nets	Stop nets	Fyke nets	Dip nets	
	Hand	Troll	Trot with baits or snoods	Trot with hooks				Com- mon	Drop
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	400								
On boats and shore:									
Regular.....	739	778	14	197	16	52	18	35	30
Casual.....	484	359		5			8	15	21
<b>Total</b> .....	<b>1,623</b>	<b>1,137</b>	<b>14</b>	<b>202</b>	<b>16</b>	<b>52</b>	<b>26</b>	<b>50</b>	<b>51</b>
<b>Vessels:</b>									
Motor.....	53								
Net tonnage.....	1,773								
Sail.....	1								
Net tonnage.....	64								
<b>Total vessels</b> .....	<b>54</b>								
<b>Total net tonnage</b> .....	<b>1,837</b>								
<b>Boats:</b>									
Motor.....	352	552	4	28	6	12		24	30
Other.....	430	70	10	140	7	29	26	34	12
Accessory boats.....	7								
<b>Apparatus:</b>									
Number.....	1,620	1,190	13	198	13	7	278	50	54
Square yards.....						11,475			
Hooks, baits, or snoods.....	2,573	1,485	2,700	85,005					

  

Item	Cast nets	Otter trawls		Pots				Spears
		Fish	Shrimp	Crab	Eel	Fish	Sea craw- fish	
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		10	107					
On boats and shore:								
Regular.....	6		795	42	2	36	44	5
Casual.....	10		8	2			24	22
<b>Total</b> .....	<b>16</b>	<b>10</b>	<b>910</b>	<b>44</b>	<b>2</b>	<b>36</b>	<b>68</b>	<b>27</b>
<b>Vessels:</b>								
Motor.....		4	41					
Net tonnage.....		109	433					
<b>Boats:</b>								
Motor.....	3		335	24	2	12	42	
Other.....	7			14		17	19	
<b>Apparatus:</b>								
Number.....	16	4	376	1,433	40	1,515	3,190	27
Yards at mouth.....		109	7,135					

## Fisheries of Florida, 1932—Continued

## OPERATING UNITS: BY GEAR—Continued

Item	Dredges		Tongs	Forks	Co-quina scoops	Hooks, sponge	Diving outfits	By- hand	Total, exclu- sive of duplica- tion
	Clam	Oyster							
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....		4							638
On boats and shore:									
Regular.....	12		356	34		402	404	55	5,988
Casual.....			48	6	4			164	1,331
Total.....	12	4	404	40	4	402	404	219	7,957
Vessels:									
Motor.....		1							98
Net tonnage.....		7							2,467
Sail.....									1
Net tonnage.....									64
Total vessels.....		1							99
Total net tonnage.....		7							2,531
Boats:									
Motor.....			123				54		2,318
Other.....			175	4		325		34	2,945
Accessory boats.....									11
Apparatus:									
Number.....	1	2	413	40	3	201	54		
Yards at mouth.....		2							

## CATCH: BY GEAR

Species	Purse seines				Haul seines			
	Menhaden		Other		Common		Long	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....							72,661	\$364
Black bass.....					10,000	\$600	243,007	16,359
Bluefish.....			8,000	\$320	141,416	3,090		
Blue runner or hardtail.....					20,868	204		
Catfish and bullheads.....					6,923	178	2,412,065	74,487
Cigarfish.....					9,350	170		
Crappie.....					12,000	360	386,596	11,379
Crevalle.....					1,320	15		
Croaker.....					3,685	44		
Drum:								
Black.....					9,620	187		
Red or redfish.....					81,233	1,237		
Flounders.....					10,275	297		
Hickory shad.....							20,887	217
Kingfish or "king mackerel".....					17,440	317		
King whiting or "kingfish".....					16,436	318		
Ladyfish.....					2,622	39		
Menhaden.....	23,328,960	\$40,931			20,900	289		
Mojarro.....					1,820	25		
Mullet.....			209,061	5,249	3,006,193	49,919	1,809	45
Permit.....					1,450	23		
Pigfish.....					5,358	62		
Pinfish or sailors choice.....					5,775	148		
Pompano.....					44,629	5,772		
Shad.....					124,650	9,970	203,327	16,266
Sheepshead.....					36,011	522		
Snapper, mangrove.....					6,016	82		
Snook or sergeantfish.....					41,805	545		
Spanish mackerel.....			362,027	14,481	376,113	10,339		
Spot.....					3,560	51		
Squeteagues or "sea trout":								
Gray.....					6,611	77		
Spotted.....					189,301	7,184		
Sunfish.....					6,500	130	651,854	16,577
Tenpounder.....					76,200	1,324		
Turtles, soft-shell.....					235	5	43,730	247
Total.....	23,328,960	40,931	579,088	20,050	4,296,315	93,524	4,036,026	135,941

## Fisheries of Florida, 1932—Continued

## CATCH: BY GEAR—Continued

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish			17,286	\$629	965,489	\$41,986		
Blue runner or hardtail					128,256	1,744		
Catfish and bullheads					7,930	169		
Creville					18,985	437		
Croaker					14,460	285		
Drum:								
Black					34,960	530		
Red or redfish					502,930	8,164		
Flounders					36,217	921		
Groupers					33,630	653		
Hickory shad			7,260	290				
King whiting or "kingfish"			8,220	164	34,770	925		
Mojarro					23,491	349		
Mullet			135,000	2,700	16,471,235	258,538		
Muttonfish					82,340	2,628		
Pigfish					58,590	854		
Pinfish or sailors choice					19,200	337		
Pompano			940	141	303,668	46,341		
Shad			212,684	25,890			5,425	\$814
Sharks	5,040,000	\$12,000						
Sheepshead					367,559	6,029		
Snapper:								
Mangrove					40,461	775		
Red					17,000	425		
Snook or sergeantfish					127,845	2,204		
Spanish mackerel			74,575	2,237	5,385,248	177,204		
Spot					63,700	859		
Squeteagues or "sea trout", spotted			4,000	200	1,750,240	68,720		
Sturgeon			4,379	199				
Tenpounder					1,645	25		
Total	5,040,000	12,000	464,344	32,450	26,489,849	621,152	5,425	814

Species	Trammel nets		Lines					
			Hand		Troll		Trot with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack			4,577	\$122				
Barracuda			4,245	180				
Black bass			18,050	1,010				
Bluefish			117,977	6,107	152,637	\$7,623		
Blue runner or hardtail			6,321	235				
Crab or crab eater			4,300	86				
Catfish and bullheads			476,096	19,043				
Croaker					275	4		
Creville			2,061	62				
Dolphin			300	9	11,750	352		
Drum:								
Black	165	\$3	2,990	93				
Red or redfish	16,750	302	134,303	1,766				
Flounders	365	12						
Groupers			3,108,523	63,302				
Grunts			19,750	567				
Hogfish			20,000	600				
Jewfish			29,080	1,012				
Kingfish or "king mackerel"					3,276,281	119,204		
King whiting or "kingfish"					2,000	100		
Mullet	581,397	11,330						
Muttonfish			102,570	5,271				
Pompano	211,058	24,520	12,121	2,374				
Porches			25,636	509				
Porkfish			363	7				
Sea bass			43,200	1,000	2,500	16		
Sharks			3,689	1,410				
Sheepshead	7,530	125	100,000	1,410				
Snapper:								
Mangrove	900	18	32,000	900				
Red			4,567,000	27,300				
Snook or sergeantfish			111,410	2,567				
Spanish mackerel			11,750	370	19,000	4,500		
Squeteagues or "sea trout"								
Gray	800	16	2,800	30				
Spotted	171,000	5,500	600,000	20,000				

## Fisheries of Florida, 1932—Continued

## CATCH: BY GEAR—Continued

Species	Trammel nets		Lines					
			Hand		Troll		Trot with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Tripletail			890	\$18				
Tuna or "horse mackerel"					3,350	\$134		
Wahoo					2,250	90		
Yellowtail			84,580	4,004				
Crabs, hard							62,220	\$3,025
Turtles, soft-shell			7,050	70				
Total	950,228	\$42,026	9,536,812	362,898	3,548,949	131,899	62,220	3,025

Species	Lines—Cont'd.		Pound nets		Stop nets		Fyke nets	
	Trot with hooks							
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			7,286	\$73				
Bluefish.....			17,211	782	440	\$16		
Blue runner or hardtail.....			7,062	128				
Cabio or crab eater.....			845	17				
Catfish and bullheads.....	275,730	\$12,272	159,910	4,389			57,432	\$1,149
Crevalle.....					385	4		
Croaker.....					3,960	45		
Drum:								
Black.....					275	4		
Red or redfish.....			6,820	124	22,748	301		
Flounders.....					6,950	142		
Grouper.....			350	7				
Jewfish.....			1,210	22				
Kingfish or "king mackerel".....			780	23				
King whiting or "kingfish".....					3,300	37		
Mojarro.....					9,053	103		
Mullet.....					710,939	9,828		
Permit.....					1,400	84		
Pigfish.....					2,600	32		
Pompano.....					8,680	922		
Porgies.....			167	17				
Sheepshead.....			150	3				
Snapper, mangrove.....			1,320	24	22,883	333		
Snook or sergeantfish.....			352	6	2,300	30		
Spanish mackerel.....					10,725	121		
Spot.....			28,000	840				
Squeteagues or "sea trout":.....					1,100	15		
Gray.....					715	8		
Spotted.....			18,700	850	83,340	3,030		
Turtles, soft-shell.....			654	14				
Total.....	275,730	12,272	250,817	7,319	891,793	15,055	57,432	1,149

Species	Dip nets				Cast nets		Otter trawls	
	Common		Drop				Fish	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....							777	\$61
Butterfish.....							997	47
Cod.....							2,039	43
Croaker.....							3,670	57
Eels.....							1,260	27
Flounders.....							306,726	8,580
Hake.....							8,218	165
King whiting or "kingfish".....							133	5
Mojarro.....					1,225	\$37		
Mullet.....					25,725	595		
Scup.....							247,792	5,936
Sea bass.....							205,274	6,037
Squeteagues or "sea trout", gray.....							10,352	537
Crabs, hard.....			3,675	\$63				
Sea crawfish or spiny lobster.....	76,380	\$4,583	93,007	7,441				
Squid.....							7,553	147
Total.....	76,380	4,583	96,682	7,504	26,950	632	794,791	21,642

*Fisheries of Florida, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Otter trawls— Continued		Pots					
	Shrimp		Crab		Eel		Fish	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Black bass.....							7, 420	\$519
Catfish and bullheads.....							135, 550	4, 527
Crappie.....							6, 330	127
Eels.....					6, 300	\$126		
Flounders.....	74, 000	\$1, 490						
Groupers.....	375	8					21, 000	630
Grunts.....							24, 641	730
Hogfish.....							8, 430	253
King whiting or "kingfish".....	220, 200	5, 330						
Muttonfish.....							18, 225	912
Snapper:								
Mangrove.....							11, 555	578
Red.....	1, 250	10					13, 000	780
Snook or sergeantfish.....							9, 985	499
Sunfish.....							4, 140	124
Turbot.....							4, 125	124
Yellowtail.....							7, 290	437
Crabs:								
Hard.....			16, 287	\$431				
Stone.....			153, 825	8, 335				
Shrimp.....	18, 136, 334	535, 198						
Total.....	18, 432, 159	542, 036	170, 112	8, 766	6, 300	126	271, 691	10, 240

Species	Pots—Contd.		Spears		Dredges			
	Sea crawfish				Clam		Oyster	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Flounders.....			20, 598	\$923				
Sea crawfish or spiny lobster.....	276, 160	\$20, 054						
Clams, hard, public.....					844, 264	\$31, 660		
Oysters:								
Market, private, spring.....							28, 186	\$1, 244
Market, private, fall.....							1, 275	56
Total.....	276, 160	20, 054	20, 598	923	844, 264	31, 660	29, 461	1, 300

Species	Tongs		Forks		Coquina scoops	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Clams:						
Coquina.....					5, 400	\$335
Hard, public.....			275, 940	\$11, 021		
Oysters:						
Market, public, spring.....	527, 738	\$26, 758				
Market, public, fall.....	592, 137	34, 070				
Market, private, spring.....	44, 132	1, 833				
Market, private, fall.....	31, 040	1, 558				
Total.....	1, 195, 047	64, 219	275, 940	11, 021	5, 400	335

Species	Hooks, sponge		Diving outfits		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Conchs.....	1, 500	\$120			603	\$61
Oysters:						
Market, public, spring.....					14, 700	735
Market, public, fall.....					67, 573	1, 598
Market, private, spring.....					114, 240	4, 809
Market, private, fall.....					81, 180	4, 706
Scallops, bay.....					61, 965	6, 885
Sponges:						
Grass.....	168, 432	34, 392	12, 935	\$2, 927		
Sheepswool.....	117, 877	185, 544	159, 210	408, 130		
Velvet.....	71	20				
Wire.....	277	97	29, 189	13, 290		
Yellow.....	47, 046	14, 794	77, 490	37, 730		
Total.....	335, 203	234, 967	278, 824	462, 077	340, 271	18, 794



## Fisheries of Florida, 1932—Continued

## CATCH: BY DISTRICTS

Species	East coast		West coast		Lake Okeechobee	
	Pounds	Value	Pounds	Value	Pounds	Value
Alwives.....	79,947	\$437				
Amberjack.....	3,077	92	1,500	\$30		
Barracuda.....	4,245	180				
Black bass.....	103,869	7,006			174,608	\$11,512
Bluefish.....	906,711	41,652	514,522	15,962		
Blue runner or hardtail.....	41,216	861	121,291	1,450		
Butterfish.....	997	47				
Cabio or crab eater.....			5,145	103		
Catfish and bullheads.....	2,713,184	80,851	59,478	1,840	728,974	33,523
Cero.....			275	4		
Cigarfish.....			9,350	170		
Cod.....	2,039	43				
Crappie.....	234,418	8,455			170,508	3,411
Crevalle.....	20,166	491	2,585	27		
Croaker.....	17,195	328	8,580	103		
Dolphin.....	12,050	361				
Drum:						
Black.....	43,500	751	4,510	66		
Red or redfish.....	45,880	1,246	718,904	10,648		
Eels.....	7,560	153				
Flounders.....	392,726	10,390	62,405	1,975		
Groupers.....	136,465	3,758	3,027,413	60,842		
Grunts.....	32,891	977	11,500	320		
Hake.....	8,218	165				
Hickory shad.....	28,147	507				
Hogfish.....	28,430	833				
Jewfish.....	20,000	800	10,290	234		
Kingfish or "king mackerel".....	2,705,775	105,159	588,726	14,385		
King whiting or "kingfish".....	279,873	6,815	5,186	65		
Ladyfish.....			2,622	39		
Menhaden.....	11,179,680	13,319	12,170,180	27,901		
Mojarro.....	6,225	137	29,364	377		
Mullet.....	2,278,890	42,682	18,862,559	295,572		
Muttonfish.....	195,585	8,596	7,550	215		
Permit.....			2,850	107		
Pigfish.....	42,740	662	23,508	286		
Pinfish or sailors choice.....	23,525	467	1,450	18		
Pompano.....	253,978	42,850	327,285	37,237		
Porgies.....	661	20	25,125	492		
Porkfish.....			363	7		
Scup.....	247,792	5,936				
Sea bass.....	247,795	8,038	3,200	64		
Shad.....	546,086	52,940				
Sharks.....			5,043,030	12,005		
Sheepshead.....	80,020	1,941	455,310	6,515		
Snapper:						
Mangrove.....	28,254	1,290	67,326	1,117		
Red.....	48,800	2,006	4,539,465	226,530		
Snook or sergeantfish.....	134,152	4,911	167,628	2,025		
Spanish mackerel.....	3,452,550	135,989	2,885,048	73,847		
Spot.....	65,120	879	3,240	46		
Squeteagues or "sea trout":						
Gray.....	10,352	537	11,066	139		
Spotted.....	527,345	24,497	2,139,180	81,928		
Sturgeon.....			4,379	190		
Sunfish.....	404,314	9,575			258,180	7,256
Tenpounder.....			77,845	1,349		
Tripletail.....			890	18		
Turbot.....	4,125	124				
Tuna or "horse mackerel".....	3,350	134				
Wahoo.....	2,250	90				
Yellowtail.....	42,290	2,537	49,580	1,904		
Crabs:						
Hard.....	78,507	3,456	3,675	63		
Stone.....	42,155	2,951	111,670	5,384		
Sea crawfish or spiny lobster.....	347,207	26,177	98,340	5,901		
Shrimp.....	17,068,073	503,925	1,068,261	31,273		
Clams:						
Coquina.....	4,200	35	1,200	300		
Hard, public.....	12,000	750	1,108,812	41,992		
Conchs.....			1,500	120		
Oysters:						
Market, public, spring.....	43,666	3,237	498,772	24,256		
Market, public, fall.....	79,111	2,329	580,604	33,339		
Market, private, spring.....	158,372	6,642	28,186	1,244		
Market, private, fall.....	112,220	6,264	1,275	56		
Scallops, bay.....			61,965	6,885		
Squid.....	7,553	147				
Turtles, soft-shell.....	12,827	123	889	19	37,953	189

*Fisheries of Florida, 1932—Continued*

## CATCH: BY DISTRICTS—Continued

Species	East coast		West coast		Lake Okeechobee	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Sponges:						
Grass.....			181,367	\$37,319		
Sheepswool.....			277,087	593,674		
Velvet.....			71	20		
Wire.....			29,466	13,387		
Yellow.....			124,536	52,524		
Total.....	45,660,349	\$1,191,576	56,259,649	1,725,917	1,370,223	\$55,891

*Sponge fishery of Florida, 1932*

## OPERATING UNITS: BY GEAR

Item	Sponge hooks	Diving outfits	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen, on boats and shore, regular.....	402	404	806
Boats:			
Motor.....		54	54
Other.....	325		325
Apparatus.....	201	54	

## CATCH: BY GEAR

Sponges	Sponge hooks		Diving outfits		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Grass.....	168,432	\$34,392	12,935	\$2,927	181,367	\$37,319
Sheepswool.....	117,877	185,544	159,210	408,130	277,087	593,674
Velvet.....	71	20			71	20
Wire.....	277	97	29,189	13,290	29,466	13,387
Yellow.....	47,046	14,794	77,490	37,730	124,536	52,524
Total.....	333,703	234,847	278,824	462,077	612,527	696,924

## SPONGES SOLD AT THE EXCHANGE, TARPON SPRINGS, FLA.

During 1932 sponges handled on the exchange at Tarpon Springs, Fla., amounted to 418,923 pounds, valued at \$517,655. This is an increase of 12 percent in quantity but a decrease of 15 percent in value as compared with the quantity and value of the transactions on the exchange during 1931. Of the total sponges sold on the exchange in 1932, 109,810 pounds, valued at \$312,318, were large wool; 60,429 pounds, valued at \$118,336, were medium, small, and rag wool; 90,144 pounds, valued at \$44,437, were yellow; 129,352 pounds, valued at \$29,273, were grass; and 29,188 pounds, valued at \$13,291, were wire. It is estimated that sponges valued at \$60,000 were sold outside of the exchange.

## ALABAMA

## Fisheries of Alabama, 1932

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, stake	Trammel nets	Lines			
				Hand	Troll	Trot with bait or snoods	Trot with hooks
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....				99			
On boats and shore:							
Regular.....	30	4	60	14	2	6	18
Casual.....			9	36		13	6
Total.....	30	4	69	149	2	19	24
Vessels, motor.....				11			
Net tonnage.....				132			
Boats:							
Motor.....	6	1	23	3	1		3
Other.....	3	4	54	18		13	24
Apparatus:							
Number.....	5	18	53	149	2	15	101
Length, yards.....	2,900						
Square yards.....		2,880	17,365				
Hooks, baits, or snoods.....				260	2	2,336	10,370

Item	Fyke nets	Otter trawls	Spears	Tongs	By hand	Total, exclusive of duplication
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....		34		22		139
On boats and shore:						
Regular.....	1	190	4	115	6	360
Casual.....			26	5	28	90
Total.....	1	224	30	142	34	589
Vessels, motor.....		17		11		31
Net tonnage.....		145		82		299
Boats:						
Motor.....	1	95		42		153
Other.....				38		151
Apparatus:						
Number.....	6	112	30	142		
Yards at mouth.....		1,465				

## CATCH: BY GEAR

Species	Haul seines		Gill nets, stake		Trammel nets		Lines	
							Hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....	9,486	\$431			2,915	\$132		
Blue runner or hardtail.....	924	17						
Catfish and bullheads.....					1,006	45	1,980	\$90
Crevaille.....	259	5						
Croaker.....	8,706	159			9,185	167	220	4
Drum:								
Black.....	302	6			440	8		
Red or redfish.....	5,326	340			32,080	1,906	6,886	399
Flounders.....	110	8			3,890	271		
Grouper.....							99,746	1,998
King whiting or "kingfish".....	3,031	55			632	12	55	1
Mullet.....	164,614	2,470			532,344	8,203		
Pompano.....	5	1			3,139	435		
Sheepshead.....	344	9			2,942	80	1,155	31
Snapper, red.....							681,573	30,263
Spanish mackerel.....	493	18			7,535	274		
Spot.....	165	3			236	4		
Squeteagues or "sea trout":								
Gray.....	660	12			3,685	67	1,705	31
Spotted.....	9,337	849			84,804	7,710	9,083	833
Sturgeon.....			10,742	\$977				
Tenpounder.....	1,400	14						
Total.....	205,162	4,397	10,742	977	684,833	19,314	802,403	33,650

*Fisheries of Alabama, 1932—Continued*

## CATCH BY GEAR—Continued

Species	Lines—Continued						Fyke nets	
	Troll		Trot with baits or snoods		Trot with hooks			
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Buffalofish.....					10,509	\$287	1,320	\$36
Cabio or crab eater.....	550	\$15						
Catfish and bullheads.....					46,775	2,126	10,450	475
Kingfish or "king mackerel".....	880	40						
Paddlefish or spoonbill cat.....					1,320	60		
Crabs, hard.....			70,070	\$982				
Total.....	1,430	55	70,070	982	58,604	2,473	11,770	511

Species	Otter trawls		Spears		Tongs		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Flounders.....			17,490	\$1,389			1,280	\$236
Crabs, soft.....								
Shrimp.....	3,381,700	\$71,910						
Oysters:								
Market, public, spring.....					748,952	\$27,216		
Market, public, fall.....					88,485	3,892		
Market, private, spring.....					3,960	220		
Market, private, fall.....					17,820	990		
Terrapin, diamond-back.....							1,089	275
Frogs.....							697	104
Total.....	3,381,700	71,910	17,490	1,389	859,217	32,318	3,066	615

## MISSISSIPPI

*Fisheries of Mississippi, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines		Dip nets, drop	Cast nets
			Hand	Trot with baits or snoods		
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			6			
On boats and shore:						
Regular.....	18	64	12	23		
Casual.....		2	114	13	35	60
Total.....	18	66	132	36	35	60
<b>Vessels:</b>						
Motor.....			1			
Net tonnage.....			8			
<b>Boats:</b>						
Motor.....	3	25	8	3		
Other.....	3	43	108	34	16	
<b>Apparatus:</b>						
Number.....	3	39	132	36	130	60
Length, yards.....	800					
Square yards.....		15,775				
Hooks, baits, or snoods.....			142	8,895		

*Fisheries of Mississippi, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Otter trawls	Spears	Dredges, oyster	Tongs	By hand	Total, exclusive of dupli- cation
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	60		424			474
On boats and shore:						
Regular.....	450	2	236	240		829
Casual.....		61		5	33	205
<b>Total</b> .....	510	63	660	245	33	1,508
<b>Vessels:</b>						
Motor.....	30		91			114
Net tonnage.....	276		1,300			1,507
Sail.....			15			15
Net tonnage.....			237			237
<b>Total vessels</b> .....	30		106			129
<b>Total net tonnage</b> .....	276		1,537			1,744
<b>Boats:</b>						
Motor.....	225		53	9		268
Other.....			5	231		407
<b>Apparatus:</b>						
Number.....	255	63	328	245		
Yards at mouth.....	3,154		329			

## CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
					Hand		Trot with baits or snoods	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bluefish.....	1,320	\$24	3,410	\$62				
Cabio or crab eater.....					110	\$2		
Catfish and bullheads.....			12,705	231	14,410	262		
Crevalle.....	660	6	110	1	220	2		
Croaker.....			5,775	99	4,620	84		
Drum:								
Black.....	440	4	7,425	97	1,072	14		
Red or redfish.....	6,600	180	60,910	1,672	7,590	210		
Flounders.....			9,080	350				
Groupers.....					16,117	322		
King whiting or "kingfish".....			2,068	33				
Mullet.....	60,000	600	483,720	7,210				
Pompano.....			132	12				
Sheepshead.....	6,600	150	15,400	355	1,815	34		
Snapper, red.....					36,812	1,841		
Squeteagues or "sea trout":								
Gray.....	10,450	190	50,600	920	41,965	763		
Spotted.....	11,000	400	69,108	2,513	44,286	1,611		
Tenpounder.....	350	4						
Tripletail.....					176	4		
Crabs, hard.....							261,895	\$3,833
Shrimp.....	7,560	144						
<b>Total</b> .....	104,980	1,702	720,443	13,555	169,193	5,149	261,895	3,833

Species	Dip nets, drop		Cast nets		Otter trawls		Spears	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Croaker.....					440	\$8		
Flounders.....					8,600	341	28,860	\$1,435
King whiting or "kingfish".....					660	12		
Mullet.....			21,250	\$125				
Crabs, hard.....	58,212	\$832						
Shrimp.....			9,000	900	13,993,160	265,354		
<b>Total</b> .....	58,212	832	30,250	1,325	14,002,860	266,748	28,860	1,435

*Fisheries of Mississippi, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dredges, oyster		Tongs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Crabs, soft.....					3,572	\$893
Oysters:						
Market, public, spring.....	4,376,770	\$164,601	95,588	\$5,182		
Market, public, fall.....	601,770	24,140	148,192	8,022		
Total.....	4,978,540	188,741	243,780	13,204	3,572	893

## LOUISIANA

*Fisheries of Louisiana, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines			Dip nets, drop
			Hand	Trot with baits or snoods	Trot with hooks	
Fishermen:						
On boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	412	48	46	183	3	8
Casual.....	4		121	135		24
Total.....	416	48	167	318	3	32
Boats:						
Motor.....	99	22	21	22	3	10
Other.....	102	22	125	279		26
Apparatus:						
Number.....	102	23	167	318	3	1,520
Length, yards.....	13,434					
Square yards.....		6,985				
Hooks, baits, or snoods.....			172	60,025	300	
Item	Cast nets	Otter trawls	Dredges, oyster	Tongs	By hand	Total, exclusive of duplication
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen:						
On vessels.....		108	50			154
On boats and shore:						
Regular.....	3	844	8	463	68	1,864
Casual.....	15			2	106	289
Total.....	18	952	58	465	174	2,307
Vessels:						
Motor.....		54	10			62
Net tonnage.....		372	93			447
Sail.....			2			2
Net tonnage.....			38			38
Total vessels.....		54	12			64
Total net tonnage.....		372	131			485
Boats:						
Motor.....		422	2	3		574
Other.....				462		990
Apparatus:						
Number.....	18	476	26	465		
Yards at mouth.....		5,942	26			

## Fisheries of Louisiana, 1932—Continued

## CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
					Hand		Trot with baits or snoods	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Catfish and bullheads.....	10, 900	\$361	13, 050	\$430	18, 450	\$694		
Crevalle.....	200	6	100	3				
Croaker.....	26, 550	1, 204	11, 820	486	6, 100	234		
Drum:								
Black.....	25, 450	837	34, 662	1, 049	27, 300	818		
Red or redfish.....	88, 650	4, 761	87, 009	4, 428	106, 080	5, 304		
Flounders.....	1, 030	72	3, 375	242				
Garfish.....			300	15				
Groupers.....					3, 400	68		
Jewfish.....					2, 400	48		
King whiting or "kingfish".....	7, 850	196	8, 150	178				
Mullet.....	2, 600	78	300	9				
Pompano.....	90	11						
Sheepshead.....	28, 150	1, 487	33, 023	1, 707	16, 500	825		
Snapper, red.....					66, 884	4, 013		
Spanish mackerel.....					400	16		
Spot.....	1, 850	44	1, 600	43				
Squeteagues or "sea trout":								
Gray.....	59, 080	1, 763	84, 361	2, 529	77, 030	2, 311		
Spotted.....	122, 057	9, 477	134, 318	10, 561	156, 052	11, 569		
Tripletail.....			890	45	100	4		
Crabs, hard.....							5, 730, 587	\$54, 904
Shrimp.....	2, 590, 040	54, 553						
Turtles, loggerhead.....	6, 450	129						
Total.....	2, 970, 947	74, 979	412, 958	21, 725	480, 696	25, 904	5, 730, 587	54, 904

Species	Lines—Cont'd		Dip nets, drop		Cast nets		Otter trawl	
	Trot with hooks							
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Catfish and bullheads.....	2, 450	\$98						
Mullet.....					3, 400	\$68		
Crabs, hard.....			147, 150	\$1, 872				
Shrimp.....					3, 870	155	35, 501, 870	\$745, 744
Total.....	2, 450	98	147, 150	1, 872	7, 270	223	35, 501, 870	745, 744

Species	Dredges, oyster		Tongs		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Crabs, soft.....					99, 340	\$25, 218
Oysters:						
Market, public, spring.....	258, 315	\$15, 396	9, 357	\$658		
Market, private, spring.....	22, 928	1, 760	1, 141, 925	90, 856		
Market, private, fall.....	96, 116	6, 758	1, 449, 420	112, 899		
Terrapin, diamond-back.....					8, 996	1, 619
Total.....	377, 359	23, 914	2, 600, 702	204, 413	108, 336	26, 877

## TEXAS

*Fisheries of Texas, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Trammel nets	Lines			
		Run-around	Stake		Hand	Troll	Trot with baits or snoods	Trot with hooks
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....					101			
On boats and shore:								
Regular.....	90	54	225	118	148	6	8	34
Casual.....	72				218		7	
Total.....	162	54	225	118	467	6	15	34
Vessels, motor.....					15			
Net tonnage.....					253			
Boats:								
Motor.....	7	14	32	40	55	4	1	5
Other.....	8	30	63	38	163		13	26
Apparatus:								
Number.....	54	47	267	61	467	8	25	48
Length, yards.....	9,315							
Square yards.....		13,165	74,845	22,071				
Hooks, baits or snoods.....					594	8	3,175	6,915

Item	Otter trawls	Spears	Dredges, oyster	Tongs	By hand	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	40		18			143
On boats and shore:						
Regular.....	462	47	90	208	60	1,223
Casual.....		105		14	42	383
Total.....	502	152	108	222	102	1,749
Vessels, motor.....	20		6			33
Net tonnage.....	157		51			388
Boats:						
Motor.....	231		33	41		382
Other.....				153	64	418
Apparatus:						
Number.....	251	152	39	222		
Yards at mouth.....	3,634		38			

## CATCH: BY GEAR

Species	Haul seines		Gill nets				Trammel nets	
			Runaround		Stake			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			1,760	\$80				
Catfish and bullheads.....	21,450	\$780	4,015	146	9,735	\$354	5,610	\$204
Croaker.....	8,800	214	5,390	98	1,540	28	8,215	177
Drum:								
Black.....	41,140	790	100,782	1,832	699,794	12,625	49,565	1,134
Red or redfish.....	73,560	4,046	44,568	2,431	366,503	19,991	127,985	7,029
Flounders.....	4,460	291	770	49			1,430	95
King whiting or "kingfish".....	5,170	94	1,715	31			1,650	30
Mullet.....	4,950	90						
Pompano.....	3,740	340	352	32			1,067	97
Sheepshead.....	5,390	117	1,865	34	5,042	92	5,775	126
Snook or sergeantfish.....	6,875	187	1,210	33	12,258	334	110	3
Spanish mackerel.....	2,640	168	2,860	182			880	55
Squeteagues or "sea trout", spotted.....	118,926	8,038	83,336	5,303	318,136	20,244	188,545	12,467
Striped bass.....							495	18
Total.....	297,101	15,155	248,623	10,251	1,413,008	53,668	391,327	21,435



*Fisheries of Texas, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines								Otter trawls <sup>7</sup>	
	Hand		Troll		Trot with baits or snoods		Trot with hooks			
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Catfish and bullheads.....	19,965	\$712					16,050	\$556		
Croaker.....	3,080	59								
Drum:										
Black.....	29,260	562					11,550	210		
Red or redfish.....	166,883	9,303					45,320	2,522		
Groupers.....	18,301	380								
Jewfish.....	5,750	165								
Kingfish or "king mackerel"			5,280	\$162						
Sheepshead.....	10,972	228					110	2		
Snapper, red.....	985,291	50,076								
Snook or sergeantfish.....	440	12								
Spanish mackerel.....	30,250	1,924	4,510	287						
Squeteagues or "sea trout", spotted.....	257,281	16,961					10,120	647		
Crabs, hard.....					44,660	\$669			9,244,246	\$229,529
Shrimp.....										
Total.....	1,527,473	80,332	9,790	449	44,660	669	83,150	3,937	9,244,246	229,529

Species	Spears		Dredges, oyster		Tongs		By hand	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Flounders.....	63,855	\$4,179						
Oysters:								
Market, public, spring.....			230,484	\$13,204	180,788	\$10,419	31,660	\$1,968
Market, public, fall.....			295,650	14,030	199,417	10,383	42,602	2,606
Total.....	63,855	4,179	526,134	27,234	380,205	20,802	74,262	4,574

FISHERIES OF THE PACIFIC COAST STATES<sup>9</sup>

The commercial yield of fishery products in the Pacific Coast States (Washington, Oregon, and California) during 1932 amounted to 560,828,471 pounds, valued at \$9,484,314 to the fishermen. This is a decrease of 6 percent in quantity and 30 percent in the value of the catch as compared with the quantity and value in 1931. Of the total catch in 1932, 542,858,774 pounds, valued at \$8,416,313, were fish; 17,032,597 pounds, valued at \$1,051,736, were shellfish; and 937,100 pounds, valued at \$16,265, were whale products. These fisheries gave employment to 17,882 fishermen, or 7 percent less than in 1931. Of the total number of fishermen employed in 1932, 6,132 were employed on vessels and 11,750 in the boat and shore fisheries.

<sup>9</sup> Data on the operating units and catch of the fisheries of the Pacific Coast States have been taken largely from statistics collected by the various State agencies. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. While statistics of the fisheries of California are for the calendar year, those for Oregon and Washington are for the fiscal year ending Mar. 31, except that statistics of the halibut fishery in these latter States are for the calendar year.

*Fisheries of the Pacific Coast States, 1932*

## SUMMARY OF CATCH

Product	Washington		Oregon	
Fish	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Shellfish, etc.	90, 180, 518	\$2, 922, 754	21, 874, 361	\$675, 933
	4, 779, 108	455, 211	1, 111, 299	52, 785
Total	94, 959, 626	3, 377, 965	22, 985, 660	728, 718

  

Product	California		Total	
Fish	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Shellfish, etc.	430, 803, 895	\$4, 817, 626	542, 858, 774	\$8, 416, 313
Whale products	11, 142, 190	543, 740	17, 032, 597	1, 051, 736
	937, 100	16, 265	937, 100	16, 265
Total	442, 883, 185	5, 377, 631	560, 828, 471	9, 484, 314

## OPERATING UNITS: BY STATES

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	2, 776	48	9	2, 833	55	29	84
On boats and shore	1, 478	3, 477	1, 014	5, 969	1, 728	1, 131	2, 859
Total	4, 254	3, 525	1, 023	8, 802	1, 783	1, 160	2, 943
<b>Vessels:</b>							
Steam	2			2			
Net tonnage	65			65			
Motor	479	24	4	507	27	9	36
Net tonnage	9, 909	212	38	10, 159	239	90	329
Sail	2			2			
Net tonnage	983			983			
Total vessels	483	24	4	511	27	9	36
Total net tonnage	10, 957	212	38	11, 207	239	90	329
<b>Boats:</b>							
Motor	750	400	585	1, 735	1, 018	818	1, 836
Other	373	143	111	627	48	95	143
<b>Apparatus:</b>							
Purse seines:							
Salmon	203			203			
Length, yards	124, 845			124, 845			
Haul seines	56		27	83	22	1	23
Length, yards	5, 320		8, 466	13, 786	16, 795	166	16, 961
Gill nets:							
Drift:							
Salmon	287	64	454	805	772	339	1, 111
Square yards	336, 679	114, 089	1, 162, 240	1, 613, 008	2, 422, 536	421, 716	2, 844, 252
Set:							
Salmon	2	173	146	321	114	439	553
Square yards	716	52, 576	35, 770	89, 062	29, 868	73, 752	103, 620
Lines:							
Trawl, set and hand	26, 950		133	27, 083	297	840	1, 137
Hooks	558, 703		5, 225	563, 928	9, 525	17, 500	27, 025
Troll	1, 760	680	58	2, 498	816	510	1, 326
Hooks	7, 920	3, 060	261	11, 241	3, 672	2, 295	5, 967
Pound nets	49	69	173	291	34		34
Brush weirs	5			5			
Fish wheels			29	29			
Dip nets	5	45	95	145	166		166
Drag bag nets	32	6		38			
Length, yards	2, 794	400		3, 194			
Reef nets	4			4			
Beam trawls	33			33			
Yards at mouth	224			224			
Otter trawls						2	2
Yards at mouth						40	40
<b>Traps:</b>							
Crab	2, 730	2, 964		5, 694		7, 560	7, 560
Crawfish					396		396
Tongs, rakes, and shovels	435	3, 042		3, 477		227	227
Spears		10		10			
Dredges, oyster		4		4			
Yards at mouth		4		4			

*Fisheries of the Pacific Coast States, 1933—Continued*

## OPERATING UNITS: BY STATES—Continued

Item	California						Grand total
	North- ern dis- trict	San Fran- cisco dis- trict	Mon- terey dis- trict	San Pedro district	San Diego district	Total	
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	18	306	526	1,623	742	3,215	6,132
On boats and shore.....	418	1,035	627	641	201	2,922	11,750
Total.....	436	1,341	1,153	2,264	943	6,137	17,882
Vessels:							
Steam.....		2				2	4
Net tonnage.....		41				41	106
Motor.....	8	32	53	199	93	385	928
Net tonnage.....	60	384	1,197	6,930	5,160	13,731	24,219
Sail.....		3				3	5
Net tonnage.....		1,124				1,124	2,107
Total vessels.....	8	37	53	199	93	390	937
Total net tonnage.....	60	1,549	1,197	6,930	5,160	14,896	24,432
Boats:							
Motor.....	195	573	219	351	119	1,457	5,028
Other.....	111	67	24	25	4	231	1,001
Apparatus:							
Purse seines:							
Barracuda.....				24		24	24
Length, yards.....				10,581		10,581	10,581
Salmon.....							203
Length, yards.....							124,845
Sardine.....			22	56		78	78
Length, yards.....			7,960	21,726		29,686	29,686
Tuna.....				59		59	59
Length, yards.....				32,718		32,718	32,718
Lampara nets:							
Mackerel.....				33		33	33
Length, yards.....				13,651		13,651	13,651
Sardine.....		20	38	21	10	89	89
Length, yards.....		5,678	12,150	9,652	2,380	29,860	29,860
Squid.....			55			55	55
Length, yards.....			11,080			11,080	11,080
Other.....				7		7	7
Length, yards.....				2,220		2,220	2,220
Haul seines.....	25	3		1		29	135
Length, yards.....	1,971	660		214		2,845	33,592
Gill nets:							
Drift:							
Barracuda.....				37	18	55	55
Square yards.....				361,280	182,010	543,290	543,290
Salmon.....	105	192				297	2,213
Square yards.....	96,600	571,392				667,992	5,125,252
Sea bass.....		8	18			26	26
Square yards.....		15,091	48,600			63,691	63,691
Shad.....		186				186	186
Square yards.....		507,854				507,854	507,854
Set:							
"California halibut".....			24			24	24
Square yards.....			55,920			55,920	55,920
Salmon.....							874
Square yards.....							192,682
Sea bass.....				41	14	55	55
Square yards.....				180,072	79,981	260,053	260,053
Miscellaneous.....	6	88	105	25	14	238	238
Square yards.....	5,472	133,545	242,207	25,995	13,290	420,509	420,509
Trammel nets.....				37	13	50	50
Square yards.....				281,163	227,624	508,787	508,787
Lines:							
Trawl, set and hand.....	197	864	1,043	1,730	1,298	5,132	33,352
Hooks.....	34,916	59,456	147,269	282,729	87,265	611,635	1,202,588
Troll.....	829	573	1,575	410	170	3,557	7,381
Hooks.....	3,881	3,289	3,433	430	170	11,203	28,411
Pound nets.....							325
Brush weirs.....							5
Fish wheels.....							29
Fyke nets.....		2,268				2,268	2,268
Dip nets.....	43	10				53	364

*Fisheries of the Pacific Coast States, 1932—Continued*

## OPERATING UNITS: BY STATES—Continued

Item	California						Grand total
	North- ern dis- trict	San Franc- isco dis- trict	Mon- terey dis- trict	San Pedro district	San Diego district	Total	
	Number	Number	Number	Number	Number	Number	Number
Bag nets, shrimp.....		13				13	13
Length, yards.....		8, 768				8, 768	8, 768
Drag bag nets.....							38
Length, yards.....							3, 194
Reef nets.....							4
Paranzella nets.....		9	2	10		21	21
Yards at mouth.....		150	33	167		350	350
Beam trawls.....		27				27	60
Yards at mouth.....		180				180	404
Otter trawls.....							2
Yards at mouth.....							40
Traps:							
Crab.....	414	4, 460				4, 874	18, 128
Crawfish.....							396
Lobster.....				4, 291	1, 938	6, 229	6, 229
Octopus.....	5		119			124	124
Harpoons:							
Swordfish and turtles.....				40	24	64	64
Whales.....		2				2	2
Tongs, rakes, and shovels.....	8	90	41	58		206	3, 910
Abalone outfits.....		1	14	3		18	18
Spears.....							10
Dredges, oyster.....							4
Yards at mouth.....							4

## CATCH: BY STATES

Species	Washington		Oregon	
	Pounds	Value	Pounds	Value
<b>FISH</b>				
Carp.....	53, 912	\$1, 078	10, 000	\$200
Cod <sup>2</sup> .....	7, 327, 590	73, 950		
Flounders:				
"Sole".....	217, 567	5, 086	54, 542	1, 320
Other.....	64, 349	1, 154	52, 240	681
Halibut.....	23, 817, 570	1, 068, 099	307, 983	13, 704
Herring.....	766, 726	11, 501	16, 968	148
"Lingcod".....	522, 662	15, 411	105, 663	2, 011
Perch.....	38, 195	1, 069	8, 344	121
Rockfishes.....	297, 190	8, 810	33, 303	559
Sablefish.....	1, 670, 744	41, 478	78, 633	1, 600
Salmon.....	52, 238, 357	1, 622, 289	19, 150, 594	609, 232
Shad.....	100, 627	2, 013	615, 308	9, 329
Smelt.....	1, 698, 132	37, 440	236, 540	5, 001
Steelhead trout.....	1, 317, 315	31, 353	1, 142, 167	29, 900
Striped bass.....			18, 139	976
Sturgeon.....	32, 370	836	43, 937	1, 151
Other fish.....	17, 212	1, 187		
Total.....	90, 180, 518	2, 922, 754	21, 874, 361	675, 933
<b>SHELLFISH, ETC.</b>				
Crabs.....	1, 403, 092	59, 522	982, 749	37, 970
Crawfish.....			80, 000	6, 000
Shrimp.....	46, 236	3, 269		
Clams:				
Hard.....	406, 431	19, 921		
Razor.....	526, 331	108, 190	31, 282	6, 343
Mixed.....			14, 759	1, 506
Octopus.....	37, 351	1, 076	33	2
Oysters:				
Eastern, market.....	2, 400	1, 370		
Japanese, market.....	2, 093, 945	126, 999		
Native, market.....	256, 731	133, 005	2, 476	964
Scallops.....	6, 591	1, 859		
Total.....	4, 779, 108	455, 211	1, 111, 299	52, 785
Grand total.....	94, 959, 626	3, 377, 965	22, 985, 660	728, 718

<sup>2</sup> The cod were taken off Alaska.

*Fisheries of the Pacific Coast States, 1932—Continued*

## CATCH: BY STATES—Continued

Species	California <sup>1</sup>		Total	
	Pounds	Value	Pounds	Value
<b>FISH</b>				
Anchovies.....	299,217	\$3,374	299,217	\$3,374
Barracuda.....	2,926,775	156,398	2,926,775	156,398
Cabrilla.....	340,008	11,898	340,008	11,898
Carp.....	29,500	438	93,412	1,716
Catfish.....	254,027	27,570	254,027	27,570
Cod <sup>2</sup> .....	4,418,539	53,590	11,746,129	127,540
Corbina.....	2,469	99	2,469	99
Eels.....	242	9	242	9
<b>Flounders:</b>				
"California halibut".....	933,927	73,206	933,927	73,206
"Sole".....	8,888,942	310,691	9,161,051	317,097
Other.....	1,234,465	42,604	1,351,054	44,439
Flyingfish.....	40,535	1,366	40,535	1,366
Grayfish.....	850,888	13,252	850,888	13,252
Groupers.....	18,689	646	18,689	646
Hake.....	28,751	407	28,751	407
Halibut.....	661,603	29,788	24,787,156	1,111,591
Headhead.....	110,557	8,040	110,557	8,040
Herring.....	765,724	4,985	1,549,418	16,634
Horse mackerel.....	536,409	14,497	536,409	14,497
Kingfish.....	447,531	10,903	447,531	10,903
"Lingcod".....	899,912	24,959	1,528,237	42,381
Mackerel.....	12,473,746	94,661	12,473,746	94,661
Marlin.....	24,676	981	24,676	981
Mullet.....	22,690	1,076	22,690	1,076
Perch.....	206,477	9,169	253,016	10,359
Pilchard or sardine.....	312,171,716	825,349	312,171,716	825,349
Pompano.....	9,633	2,580	9,633	2,580
Rock bass.....	436,564	21,483	436,564	21,483
Rockfishes.....	5,636,309	171,274	5,966,802	180,643
Ruddersfish.....	36,826	1,936	36,826	1,936
Sablefish.....	975,373	20,203	2,724,750	63,281
Salmon.....	4,699,120	161,740	76,088,071	2,393,261
Sculpin.....	90,181	5,873	90,181	5,873
<b>Sea bass:</b>				
Black.....	473,394	16,560	473,394	16,560
White.....	806,504	60,818	806,504	60,818
Shad.....	1,173,471	29,342	1,889,406	40,684
Sheepshead.....	89,591	2,328	89,591	2,328
Skates.....	292,412	4,622	292,412	4,622
Smelt.....	894,096	33,472	2,828,768	75,913
Spanish mackerel.....	10,822	567	10,822	567
Splittail.....	24,420	650	24,420	650
Squawfish.....	2,004	99	2,004	99
Steelhead trout.....			2,459,482	61,253
Striped bass.....	537,376	45,883	555,515	46,859
Sturgeon.....			76,307	1,987
Suckers.....	6,525	52	6,525	52
Swordfish.....	662,705	58,465	662,705	58,465
Tomcod.....	4,271	171	4,271	171
<b>Tuna and tunalike fishes:</b>				
Albacore.....	619,694	31,062	619,694	31,062
Bluefin.....	1,071,206	50,637	1,071,206	50,637
Bonito.....	2,862,286	53,465	2,862,286	53,465
Skipjack or striped tuna.....	21,636,577	751,499	21,636,577	751,499
Yellowfin.....	36,923,410	1,504,812	36,923,410	1,504,812
Whitebait.....	133,746	6,406	133,746	6,406
Whitefish.....	162,027	8,053	162,027	8,053
Yellowtail.....	1,796,364	51,161	1,796,364	51,161
Other fish.....	148,973	2,457	166,185	3,644
<b>Total.....</b>	<b>430,803,895</b>	<b>4,817,626</b>	<b>542,858,774</b>	<b>8,416,313</b>
<b>SHELLFISH, ETC.</b>				
Crabs.....	2,434,132	201,733	4,819,973	299,225
Crawfish.....			80,000	6,000
Sea crawfish or spiny lobster.....	1,018,647	142,398	1,018,647	142,398
Shrimp.....	2,682,789	40,512	2,729,025	43,781
Abalone.....	563,469	77,386	563,469	77,386
<b>Clams:</b>				
Cockle.....	36,722	8,636	36,722	8,636
Hard.....			406,431	19,921
Pismo.....	27,576	7,297	27,576	7,297
Razor.....	1,307	380	558,920	114,913
Soft.....	61,410	13,978	61,410	13,978
Mixed.....	158	45	14,917	1,551
Mussels, sea.....	23	13	23	13
Octopus.....	21,187	1,472	58,571	2,550

<sup>1</sup> Taken off the Pacific coast including Latin America.<sup>2</sup> The cod were taken off Alaska.

*Fisheries of the Pacific Coast States, 1932—Continued*

## CATCH: BY STATES—Continued

Species	California		Total	
SHELLFISH, ETC.—continued				
Oysters:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Eastern, market.....	39,227	\$12,258	41,627	\$13,628
Japanese, market.....	9,142	2,286	2,103,087	129,285
Native, market.....	10,930	4,544	270,137	138,513
Scallops.....			6,591	1,859
Squid.....	4,229,743	30,514	4,229,743	30,514
Turtles.....	5,728	288	5,728	288
Total.....	11,142,190	543,740	17,032,597	1,051,736
WHALE PRODUCTS				
Whale meat.....	434,000	9,765	434,000	9,765
Whale oil.....	503,100	6,500	503,100	6,500
Total.....	937,100	16,265	937,100	16,265
Grand total.....	442,883,185	5,377,631	560,828,471	9,484,314

## WASHINGTON

*Fisheries of Washington, 1932*

## CATCH: BY DISTRICTS

Species	Puget Sound district		Coastal district		Columbia River district	
FISH	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Carp.....					53,912	\$1,078
Cod <sup>1</sup> .....	7,327,590	\$73,950				
Flounders:						
"Sole".....	217,567	5,086				
Other.....	64,349	1,154				
Halibut.....	23,746,928	1,064,591	1,752	\$53	68,890	3,455
Herring.....	766,726	11,501				
"Lingcod".....	477,996	14,696	17,854	179	26,812	536
Perch.....	38,195	1,069				
Rockfishes.....	282,484	8,593	5,978	60	8,728	157
Sablefish.....	1,661,972	41,281			8,772	197
Salmon:						
Blueback, red or sockeye.....	5,867,099	343,224	852,120	42,606	93,761	5,626
Chinook or king.....	7,925,196	403,719	2,612,937	89,616	7,197,214	291,001
Chum or keta.....	11,302,705	114,438	3,208,332	8,021	686,269	1,716
Humpback or pink.....	68,600	686				
Silver or coho.....	8,539,150	227,465	3,196,520	75,312	688,454	18,859
Shad.....					100,627	2,013
Smelt.....	130,264	4,664	106,090	3,183	1,461,778	29,593
Steelhead trout.....	68,325	4,092	114,015	4,561	1,134,975	22,700
Sturgeon.....	504	35	900	27	30,966	774
Other fish.....	17,212	1,187				
Total.....	68,502,862	2,321,431	10,116,498	223,618	11,561,158	377,705
SHELLFISH						
Crabs.....	387,552	15,854	1,015,540	43,668		
Shrimp.....	46,236	3,269				
Clams:						
Hard:						
Butter.....	112,027	5,489				
Little neck.....	293,899	14,401				
Other.....			505	31		
Razor.....			526,331	108,190		
Octopus.....	37,351	1,076				
Oysters:						
Eastern, market.....			2,400	1,370		
Japanese, market.....	567,444	35,465	1,526,501	91,534		
Native, market.....	223,341	120,628	33,390	12,377		
Scallops.....	6,591	1,859				
Total.....	1,674,441	198,041	3,104,667	257,170		
Grand total.....	70,177,303	2,519,472	13,221,165	480,788	11,561,158	377,705

<sup>1</sup> The cod were taken off Alaska.

*Fisheries of the Puget Sound district of Washington, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines, salmon	Haul seines	Gill nets		Lines		Pound nets	Brush weirs
			Drift, salmon	Set, salmon	Trawl, set, and hand	Troll		
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	1,494	15	-----	-----	1,079	216	14	-----
On boats and shore.....	-----	149	295	2	64	310	119	10
Total.....	1,494	164	295	2	1,143	526	133	10
<b>Vessels:</b>								
Steam.....							1	-----
Net tonnage.....							42	-----
Motor.....	203	4	-----	-----	145	122	3	-----
Net tonnage.....	4,856	31	-----	-----	4,046	997	101	-----
Sail.....					2	-----	-----	-----
Net tonnage.....					983	-----	-----	-----
Total vessels.....	203	4	-----	-----	147	122	4	-----
Total net tonnage.....	4,856	31	-----	-----	5,029	997	143	-----
<b>Boats:</b>								
Motor.....		30	276	2	66	230	-----	-----
Other.....		24	11	-----	167	-----	-----	5
<b>Apparatus:</b>								
Number.....	203	56	287	2	26,950	1,760	49	5
Length, yards.....	124,845	5,320	-----	-----	-----	-----	-----	-----
Square yards.....	-----	-----	336,679	716	-----	-----	-----	-----
Hooks.....	-----	-----	-----	-----	558,703	7,920	-----	-----

  

Item	Dip nets	Drag bag nets	Reef nets	Beam trawls	Traps, crab	Tongs and rakes	Shovels	Total, exclusive of duplication
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	-----	-----	-----	65	-----	4	-----	2,776
On boats and shore.....	5	93	16	21	130	107	314	1,478
Total.....	5	93	16	86	130	111	314	4,254
<b>Vessels:</b>								
Steam.....				1	-----	-----	-----	2
Net tonnage.....				23	-----	-----	-----	65
Motor.....				23	-----	-----	-----	479
Net tonnage.....				309	-----	-----	-----	9,909
Sail.....				-----	-----	-----	-----	2
Net tonnage.....				-----	-----	-----	-----	983
Total vessels.....				24	-----	-----	-----	483
Total net tonnage.....				332	-----	-----	-----	10,957
<b>Boats:</b>								
Motor.....		27	4	9	124	24	-----	750
Other.....	5	9	8	-----	6	142	-----	373
<b>Apparatus:</b>								
Number.....	5	32	4	33	2,730	121	314	-----
Length, yards.....	-----	2,794	-----	-----	-----	-----	-----	-----
Yards at mouth.....	-----	-----	-----	224	-----	-----	-----	-----

*Fisheries of the Puget Sound district of Washington, 1932—Continued*

## CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Drift		Set	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:			1,210	\$28				
“Sole”			685	12				
Other								
Herring	732	\$11	40,376	606				
“Lingcod”	104	3	337	10			1,355	\$41
Perch			28,937	810				
Rockfishes			6,130	210			823	28
Salmon:								
Blueback, red or sockeye	2,613,996	152,919			17,143	\$1,003		
Chinook or king	606,474	12,918			526,988	30,302		
Chum or keta	10,357,105	103,571			440,630	5,067		
Humpback or pink	50,000	500			15			
Silver or coho	5,174,840	121,609	13,067	394	235,312	8,471	3,410	122
Smelt	1,567	56	82,531	2,955				
Steelhead trout	10,404	624			12,021	714		
Other fish			400	8				
Total	18,815,222	392,211	173,673	5,033	1,232,109	45,557	5,588	191

Species	Lines				Pound nets		Brush weirs	
	Trawl, set, and hand		Troll					
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod	7,327,590	\$73,950						
Flounders:								
“Sole”					500	\$7		
Other					1,328	20		
Halibut	23,690,776	1,062,345	55,475	\$2,219	648	26	723,190	\$10,848
Herring								
“Lingcod”	440,354	13,557	19,223	577	1,855	56		
Perch					15			
Rockfishes	242,875	7,236	450	14				
Sablefish	1,661,972	41,281						
Salmon:								
Blueback, red or sock-			119	6	3,227,973	188,836		
eye								
Chinook or king			3,733,888	184,673	3,057,318	175,796		
Chum or keta					500,170	5,752		
Humpback or pink			55	1	18,440	184		
Silver or coho			2,281,145	66,940	821,816	29,585		
Steelhead trout					45,900	2,754		
Sturgeon					504	35		
Other fish	120	2			364	7		
Total	33,363,687	1,198,371	6,090,355	254,430	7,676,831	403,058	723,190	10,848
SHELLFISH								
Octopus	36,486	1,051			85	2		
Grand total	33,400,173	1,199,422	6,090,355	254,430	7,676,916	403,060	723,190	10,848



*Fisheries of the Puget Sound district of Washington, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dip nets		Drag bag nets		Reef nets		Beam trawls	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>								
Flounders:								
" Sole "							215, 857	\$5, 051
Other							62, 336	1, 122
Halibut							29	1
Herring	2, 228	\$33	200	\$3				
" Lingcod "							14, 768	452
Perch			8, 841	248			402	11
Rockfishes							32, 206	1, 105
Salmon:								
Blueback, red or sockeye					7, 868	\$460		
Chinook or king					528	30		
Chum or keta					4, 800	48		
Humpback or pink					90	1		
Silver or coho					9, 560	344		
Smelt			46, 166	1, 653				
Other fish			5, 171	181			11, 157	989
Total	2, 228	33	60, 378	2, 085	22, 846	883	336, 755	8, 731
<b>SHELLFISH</b>								
Shrimp							46, 236	3, 269
Octopus			760	22			20	1
Scallops							6, 591	1, 859
Total			760	22			52, 847	5, 129
Grand total	2, 228	33	61, 138	2, 107	22, 846	883	389, 602	13, 860

Species	Traps		Tongs and rakes		Shovels	
	Pounds	Value	Pounds	Value	Pounds	Value
<b>SHELLFISH</b>						
Crabs	387, 552	\$15, 854				
Clams:						
Hard:						
Butter					112, 027	\$5, 489
Little neck					293, 899	14, 401
Oysters:						
Japanese, market			567, 444	\$35, 465		
Native, market			223, 341	120, 628		
Total	387, 552	15, 854	790, 785	156, 093	405, 926	19, 890

NOTE.—The catch of sea cucumbers is included with "Other fish" under beam trawls.

*Fisheries of the coastal district of Washington, 1932*

## OPERATING UNITS: BY GEAR

Item	Gill nets		Lines, troll	Pound nets	Dip nets	Drag bag nets
	Drift, salmon	Set, salmon				
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....			25			
On boats and shore.....	75	147	170	41	45	40
Total.....	75	147	195	41	45	40
Vessels:						
Motor.....			14			
Net tonnage.....			125			
Boats:						
Motor.....	64	94	126	30		
Other.....		58		22		6
Apparatus:						
Number.....	64	173	680	69	45	6
Length, yards.....						400
Square yards.....	114, 089	52, 576				
Hooks.....			3, 060			

*Fisheries of the coastal district of Washington, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Traps, crab	Tongs and rakes	Shovels	Spears	Dredges	Total, exclusive of dupli- cation
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	15				8	48
On boats and shore.....	81	71	2,967	10		3,477
Total.....	96	71	2,967	10	8	3,525
<b>Vessels:</b>						
Motor.....	8				2	24
Net tonnage.....	74				13	212
<b>Boats:</b>						
Motor.....	73	19				400
Other.....	8	51				143
<b>Apparatus:</b>						
Number.....	2,964	75	2,967	10	4	
Yards at mouth.....					4	

## CATCH: BY GEAR

Species	Gill nets				Lines, troll	
	Drift		Set <sup>1</sup>			
		Pounds	Value	Pounds	Value	Pounds
FISH						
Halibut.....					1, 752	\$53
"Lingcod".....					17, 854	179
Rockfishes.....					5, 978	60
Salmon:						
Blueback, red or sockeye.....			852, 120	\$42, 606		
Chinook or king.....	356, 109	\$7, 834	242, 754	5, 341	1, 785, 109	71, 404
Chum or keta.....	296, 616	742	1, 176, 420	2, 941		
Silver or coho.....	254, 480	5, 599	864, 484	19, 019	1, 691, 626	42, 798
Steelhead trout.....	190	8	109, 695	4, 388		
Sturgeon.....	210	6				
Total.....	907, 605	14, 189	3, 245, 473	74, 295	3, 502, 319	114, 494

Species	Pound nets		Dip nets		Drag bag nets	
<b>FISH</b>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
<b>Salmon:</b>						
Chinook or king.....	228,965	\$5,037				
Chum or keta.....	1,735,296	4,338				
Silver or coho.....	385,930	7,896				
Smelt.....			26,090	\$783	80,000	\$2,400
Steelhead trout.....	4,130	165				
Sturgeon.....	690	21				
Total.....	2,355,011	17,457	26,090	783	80,000	2,400

Species	Traps		Dredges, tongs, and rakes		Shovels	
<b>SHELLFISH</b>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Crabs.....	1,015,540	\$43,668				
<b>Clams:</b>						
Hard.....					505	\$31
Razor.....					526,331	108,190
<b>Oysters:</b>						
Eastern, market.....			2,400	\$1,370		
Japanese, market.....			1,526,501	91,534		
Native, market.....			33,390	12,377		
Total.....	1,015,540	43,668	1,562,291	105,281	526,836	108,221

<sup>1</sup> Includes catch by spears.

*Fisheries of the Columbia River district of Washington, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets	Fish wheels	Dip nets	Total, exclusive of duplication
		Drift, salmon	Set, salmon	Trawl and set	Troll				
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	-----	-----	-----	4	5	-----	-----	-----	9
On boats and shore.....	238	571	57	10	13	104	18	95	1,014
Total.....	238	571	57	14	18	104	18	95	1,023
Vessels:									
Motor.....	-----	-----	-----	1	3	-----	-----	-----	4
Net tonnage.....	-----	-----	-----	15	23	-----	-----	-----	38
Boats:									
Motor.....	17	454	36	8	10	76	-----	50	585
Other.....	25	-----	21	2	-----	54	-----	15	111
Apparatus:									
Number.....	27	454	146	133	58	173	29	95	-----
Length, yards.....	8,466	-----	-----	-----	-----	-----	-----	-----	-----
Square yards.....	-----	1,162,240	35,770	-----	-----	-----	-----	-----	-----
Hooks.....	-----	-----	-----	5,225	261	-----	-----	-----	-----

## CATCH: BY GEAR

Species	Haul seines		Gill nets				Lines, trawl and set	
			Drift		Set			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....	53,912	\$1,078						
Halibut.....							68,890	\$3,455
"Lingcod".....							26,812	536
Rockfishes.....							8,728	157
Sablefish.....							8,772	197
Salmon:								
Blueback, red or sockeye.....	7,283	437	12,010	\$721	1,008	\$61		
Chinook or king.....	1,137,295	45,492	3,331,798	135,271	23,595	958		
Chum or keta.....	1,120	3	368,686	922				
Silver or coho.....	24,110	645	141,161	3,769	1,563	42		
Shad.....	23,126	463	59,845	1,197	477	10		
Smelt.....			357,243	7,502				
Steelhead trout.....	147,831	2,957	368,450	7,369	7,487	150		
Sturgeon.....	358	9	11,619	290	2,901	72	4,716	118
Total.....	1,395,065	51,084	4,650,812	157,041	37,031	1,293	117,918	4,463

Species	Lines, troll		Pound nets		Fish wheels		Dip nets	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Salmon:								
Blueback, red or sockeye.....	-----	-----	49,122	\$2,947	23,151	\$1,389	1,187	\$71
Chinook or king.....	21,274	\$851	2,143,838	\$7,040	449,631	17,798	89,783	3,591
Chum or keta.....	-----	-----	316,463	791	-----	-----	-----	-----
Silver or coho.....	176,984	5,203	340,685	9,096	51	1	3,867	103
Shad.....	-----	-----	7,770	155	9,409	188	-----	-----
Smelt.....	-----	-----	-----	-----	-----	-----	1,104,535	22,091
Steelhead trout.....	-----	-----	559,856	11,197	39,510	790	11,841	237
Sturgeon.....	-----	-----	4,105	103	7,267	182	-----	-----
Total.....	198,258	6,054	3,421,839	111,329	529,022	20,345	1,211,213	26,093

## OREGON

*Fisheries of Oregon, 1932*

## CATCH: BY DISTRICTS

Species	Columbia River district		Coastal district	
	Pounds	Value	Pounds	Value
<b>FISH</b>	10, 000	\$200		
Carp.....				
Flounders:				
"Sole".....	2, 913	73	51, 629	\$1, 247
Other.....	1, 002	20	51, 238	661
Halibut.....	157, 400	7, 759	150, 583	5, 945
Herring.....			16, 968	148
"Lingcod".....	20, 478	410	85, 185	1, 601
Perch.....			8, 344	121
Rockfishes.....	12, 911	226	20, 392	333
Sablefish.....	27, 749	624	50, 884	976
Salmon:				
Blueback, red, or sockeye.....	91, 015	5, 461		
Chinook or king.....	8, 845, 006	358, 472	1, 814, 138	45, 766
Chum or keta.....	550, 862	1, 378	97, 893	245
Silver or coho.....	2, 876, 838	83, 647	4, 874, 842	114, 263
Shad.....	218, 289	4, 366	397, 019	4, 963
Smelt.....	233, 143	4, 896	3, 397	105
Steelhead trout.....	965, 708	19, 313	176, 459	10, 587
Striped bass.....			18, 139	976
Sturgeon.....	40, 466	1, 042	3, 471	109
Total.....	14, 053, 780	487, 887	7, 820, 581	188, 046
<b>SHELLFISH</b>				
Crabs.....			982, 749	37, 970
Crawfish.....	80, 000	6, 000		
Clams:				
Razor.....			31, 282	6, 343
Mixed.....			14, 759	1, 506
Octopus.....			33	2
Oysters, native, market.....			2, 476	964
Total.....	80, 000	6, 000	1, 031, 299	46, 785
Grand total.....	14, 133, 780	493, 887	8, 851, 880	234, 831

*Fisheries of the Columbia River district of Oregon, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets	Dip nets	Traps, crawfish	Total, exclusive of duplication
		Drift, salmon	Set, salmon	Trawl and set	Troll				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....				8	47				55
On boats and shore.....	286	992	51	39	181	29	166	22	1, 728
Total.....	286	992	51	47	228	29	166	22	1, 783
<b>Vessels:</b>									
Motor.....				2	25				27
Net tonnage.....				27	212				239
<b>Boats:</b>									
Motor.....	14	772	45	30	145	18		18	, 018
Other.....	21		6	9		10		4	48
<b>Apparatus:</b>									
Number.....	22	772	114	297	816	34	166	396	
Length, yards.....	16, 795								
Square yards.....		2, 422, 536	29, 868						
Hooks.....				9, 525	3, 672				

*Fisheries of the Columbia River district of Oregon, 1932—Continued*

## CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines			
					Trawl and set		Troll	
FISH	Pounds 10, 000	Value \$200	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....								
Flounders:								
"Sole".....					2, 913	\$73		
Other.....					1, 002	20		
Halibut.....					157, 400	7, 759		
"Lingcod".....					20, 478	410		
Rockfishes.....					12, 911	226		
Sablefish.....					27, 749	624		
Salmon:								
Blueback, red, or sockeye.....	16, 843	1, 011	39, 786	\$2, 387				
Chinook or king.....	1, 019, 283	40, 771	7, 275, 704	295, 394			188, 401	\$7, 689
Chum or keta.....	29, 441	74	490, 646	1, 227				
Silver or coho.....	3, 861	103	212, 538	5, 675			2, 578, 244	75, 675
Shad.....	59, 542	1, 191	158, 438	3, 169				
Smelt.....			233, 143	4, 896				
Steelhead trout.....	359, 811	7, 196	451, 570	9, 031				
Sturgeon.....	365	10	29, 852	756	7, 147	191		
Total.....	1, 499, 146	50, 556	8, 891, 677	322, 535	229, 600	9, 303	2, 766, 645	83, 364

Species	Pound nets		Dip nets		Traps	
<b>FISH</b>						
Salmon:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Blueback, red, or sockeye	32,980	\$1,979	1,406	\$84		
Chinook or king	252,253	10,243	109,365	4,375		
Chum or keta	30,775	77				
Silver or coho	77,909	2,080	4,286	114		
Shad	309	6				
Steelhead trout	144,868	2,897	9,459	189		
Sturgeon	744	14	2,358	71		
<b>Total</b>	539,838	17,296	126,874	4,833		
<b>SHELLFISH</b>						
Crawfish					80,000	\$6,000
<b>Grand total</b>	539,838	17,296	126,874	4,833	80,000	6,000

*Fisheries of the coastal district of Oregon, 1932*

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Otter trawls	Traps, crab	Tongs	Shovels	Total, exclusive of duplication
		Drift, salmon	Set, salmon	Trawl and set	Troll					
<b>Fishermen:</b>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
On vessels.....				19	6	8				29
On boats and shore.....	2	428	175	6	158		240	1	226	1,131
Total.....	2	428	175	25	164	8	240	1	226	1,160
<b>Vessels:</b>										
Motor.....				5	3	2				9
Net tonnage.....				60	22	29				90
<b>Boats:</b>										
Motor.....	1	406	112				219	1		818
Other.....	1	22	59	2	119		21	1		95
<b>Apparatus:</b>										
Number.....	1	339	439	840	510	2	7,560	1	226	
Length, yards.....	166									
Square yards.....		421,716	73,752							
Yards at mouth.....						40				
Hooks.....				17,500	2,295					

*Fisheries of the coastal district of Oregon, 1932—Continued*

## CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines			
					Trawl and set		Troll	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
"Sole".....			996	\$17	6,908	\$114		
Other.....	2,934	\$57	24,583	272	2,304	25		
Halibut.....					146,062	5,744	2,401	\$119
Herring.....	12,850	106	4,118	42				
"Lingcod".....					52,911	946	25,307	509
Perch.....	5,473	76	2,612	42				
Rockfishes.....					16,486	272		
Sablefish.....					50,884	976		
Salmon:								
Chinook or king.....			1,737,737	43,443			76,401	2,323
Chum or keta.....			97,893	245				
Silver or coho.....			3,151,404	55,150			1,722,728	59,090
Shad.....			397,019	4,963				
Smelt.....	492	20	2,905	85				
Steelhead trout.....			176,425	10,585			34	2
Striped bass.....			17,997	974				
Sturgeon.....			3,352	101				
Total.....	21,749	259	5,617,041	115,919	275,555	8,077	1,826,871	62,041
SHELLFISH								
Octopus.....					33	2		
Grand total.....	21,749	259	5,617,041	115,919	275,588	8,079	1,826,871	62,041

  

Species	Otter trawls		Traps		Tongs		Shovels	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
"Sole".....	43,725	\$1,116						
Other.....	21,417	307						
Halibut.....	2,120	82						
"Lingcod".....	6,967	148						
Perch.....	259	3						
Rockfishes.....	3,906	61						
Salmon, silver or coho.....	710	23						
Striped bass.....	142	2						
Sturgeon.....	119	8						
Total.....	79,365	1,750						
SHELLFISH								
Crabs.....			982,749	\$37,970				
Clams:								
Razor.....							31,282	\$6,343
Mixed.....							14,759	1,506
Oysters, native, market.....					2,476	\$964		
Total.....			982,749	37,970	2,476	964	46,041	7,849
Grand total.....	79,365	1,750	982,749	37,970	2,476	964	46,041	7,849

## CALIFORNIA

*Fisheries of California, 1932*

## CATCH: BY DISTRICTS

Species	Northern district		San Francisco district		Monterey district	
FISH	Pounds	Value	Pounds	Value	Pounds	Value
Anchovies.....			147, 627	\$1, 476	120, 043	\$1, 269
Barracuda.....					2, 968	193
Carp.....			29, 500	438		
Catfish.....			254, 027	27, 570		
Cod.....			4, 418, 539	53, 590		
Eels.....			208	8		
Flounders:						
"California halibut".....			389	27	50, 407	3, 591
"Sole".....	5, 082, 583	\$177, 890	3, 095, 571	108, 345	410, 795	15, 205
Other.....	404, 667	14, 870	728, 071	23, 131	92, 920	2, 925
Grayfish.....	5, 140	51	216, 234	2, 163	8, 263	74
Hake.....	10, 143	152	13, 291	200	4, 893	49
Halibut.....	645, 828	28, 603	15, 775	1, 185		
Hardhead.....			110, 557	8, 040		
Herring.....	8, 699	191	726, 925	4, 399	18, 136	185
Horse mackerel.....					119, 268	5, 339
Kingfish.....	945	38	4, 914	172	140, 455	4, 963
"Linccod".....	465, 434	9, 414	302, 227	10, 578	130, 268	4, 900
Mackerel.....			3, 056	122	665, 919	13, 318
Perch.....	18, 613	567	74, 866	2, 937	59, 485	2, 253
Pilchard or sardine.....	140	2	29, 357, 768	73, 824	168, 284, 301	422, 204
Pompano.....					240	47
Rockfishes.....	389, 895	7, 771	663, 194	21, 618	2, 071, 152	55, 375
Sablefish.....	618, 532	11, 280	45, 223	1, 244	229, 806	4, 702
Salmon.....	3, 128, 939	103, 572	1, 489, 281	52, 474	80, 884	5, 692
Sculpin.....	46	1	3, 561	178	912	11
Sea bass:						
Black.....					81	3
White.....			9, 212	896	25, 632	1, 965
Shad.....			1, 173, 355	29, 338	29	1
Skates.....	27, 108	407	205, 272	3, 079	29, 176	544
Smelt.....	65, 553	2, 221	288, 468	13, 164	188, 461	7, 106
Splittail.....			24, 420	650		
Squawfish.....			2, 004	99		
Striped bass.....			537, 376	45, 883		
Suckers.....			6, 525	52		
Tomcod.....	2, 619	105	1, 652	66		
Tuna and tunalike fishes:						
Albacore.....	21	3			606, 313	30, 211
Bluefin.....					38	3
Bonito.....					31	2
Whitebait.....	91, 325	3, 396	28, 317	2, 237	14, 104	773
Other fish.....	119, 696	1, 784	17, 880	272	4, 453	133
Total.....	11, 085, 926	362, 318	43, 995, 285	489, 455	173, 359, 433	583, 036
SHELLFISH						
Crabs.....	116, 458	9, 165	2, 290, 131	190, 873	27, 398	1, 686
Shrimp.....			2, 681, 807	40, 227	982	285
Abalone.....			25	5	427, 075	63, 884
Clams:						
Cockle.....	74	13	29, 736	7, 122	13	2
Pismo.....					6, 289	1, 443
Soft.....	7, 948	1, 284	53, 462	12, 694		
Mixed.....			154	44	4	1
Mussels.....	18	12				
Octopus.....	1, 732	112	1, 649	115	17, 554	1, 217
Oysters, market:						
Eastern.....			39, 227	12, 258		
Japanese.....					9, 142	2, 286
Native.....	647	260	10, 283	4, 284		
Squid.....					4, 087, 621	27, 261
Total.....	126, 877	10, 846	5, 106, 474	267, 622	4, 576, 078	98, 065
WHALE PRODUCTS						
Whale meat.....			434, 000	9, 765		
Whale oil.....			503, 100	6, 500		
Total.....			937, 100	16, 265		
Grand total.....	11, 212, 803	373, 164	50, 038, 859	773, 342	177, 935, 511	681, 101

*Fisheries of California, 1932—Continued*

## CATCH: BY DISTRICTS—Continued

Species	San Pedro district					
	Off California		Off Latin America		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>						
Anchovies.....	31,547	\$629			31,547	\$629
Barracuda.....	2,033,875	97,718	372,005	\$31,348	2,405,880	129,066
Cabrilla.....			102,989	3,458	102,989	3,458
Corbina.....			2,469	99	2,469	99
Eels.....	34	1			34	1
Flounders:						
"California halibut".....	802,841	62,915	1,528	97	804,369	63,012
"Sole".....	298,376	9,100			298,376	9,100
Other.....	8,794	1,677			8,794	1,677
Flyingfish.....	40,535	1,366			40,535	1,366
Grayfish.....	482,776	10,359			482,776	10,359
Groupers.....			3,774	113	3,774	113
Hake.....	424	6			424	6
Herring.....	103	5			103	5
Horse mackerel.....	417,141	9,158			417,141	9,158
Kingfish.....	298,913	5,672			298,913	5,672
"Lingcod".....	1,971	66			1,971	66
Mackerel.....	11,626,356	78,309			11,626,356	78,309
Marlin.....	20,071	791			20,071	791
Mullet.....	3,657	205			3,657	205
Perch.....	52,646	3,394			52,646	3,394
Pilchard or sardine.....	113,984,444	325,246			113,984,444	325,246
Pompano.....	5,317	2,020	3,728	485	9,045	2,505
Rock bass.....	248,022	13,469	3,522	200	251,544	13,669
Rockfishes.....	1,843,284	62,783			1,843,284	62,783
Rudderfish.....	35,611	1,881			35,611	1,881
Sablefish.....	81,812	2,977			81,812	2,977
Salmon.....	16	2			16	2
Sculpin.....	72,101	4,883			72,101	4,883
Sea bass:						
Black.....	70,999	2,793	150,257	6,181	221,256	8,974
White.....	542,906	42,117	79,401	6,049	622,307	48,166
Shad.....	87	3			87	3
Sheepshead.....	79,754	2,028	41	1	79,795	2,029
Skates.....	30,477	587			30,477	587
Smelt.....	320,746	10,291			320,746	10,291
Spanish mackerel.....			3,209	192	3,209	192
Swordfish.....	446,350	37,730	8,485	787	454,835	38,517
Tuna and tunalike fishes:						
Albacore.....	13,360	848			13,360	848
Bluefin.....	437,287	25,057	608,170	24,328	1,045,457	49,385
Bonito.....	965,554	17,756	1,139,808	22,559	2,105,362	40,315
Skipjack or striped tuna.....	27,459	961	8,267,392	288,196	8,294,851	289,157
Yellowfin.....	4,494	299	16,072,041	657,767	16,076,535	658,066
Whitefish.....	61,697	3,618	2,274	132	63,971	3,750
Yellowtail.....	763,781	20,951	524,645	15,744	1,288,426	36,695
Other fish.....	6,922	267			6,922	267
<b>Total.....</b>	<b>136,162,540</b>	<b>859,938</b>	<b>27,345,738</b>	<b>1,057,736</b>	<b>163,508,278</b>	<b>1,917,674</b>
<b>SHELLFISH</b>						
Crabs.....	145	9			145	9
Sea crawfish or spiny lobster.....	254,659	35,914	25,066	4,086	279,725	40,000
Abalone.....	136,369	13,497			136,369	13,497
Clams:						
Cockle.....	6,899	1,499			6,899	1,499
Pismo.....	21,287	5,854			21,287	5,854
Razor.....	1,307	380			1,307	380
Mussels.....	5	1			5	1
Octopus.....	183	20			183	20
Squid.....	142,007	3,244			142,007	3,244
<b>Total.....</b>	<b>562,861</b>	<b>60,418</b>	<b>25,066</b>	<b>4,086</b>	<b>587,927</b>	<b>64,504</b>
<b>Grand total.....</b>	<b>136,725,401</b>	<b>920,356</b>	<b>27,370,804</b>	<b>1,061,822</b>	<b>164,096,205</b>	<b>1,982,178</b>



*Fisheries of California, 1932—Continued*

## CATCH: BY DISTRICTS—Continued

Species	San Diego district					
	Off California		Off Latin America		Total	
FISH	Pounds	Value	Pound	Value	Pounds	Value
Barracuda.....	468, 258	\$22, 877	49, 669	\$4, 262	517, 927	\$27, 139
Cabrilla.....			237, 019	8, 440	237, 019	8, 440
Flounders:						
"California halibut".....	69, 589	5, 604	9, 173	972	78, 762	6, 576
"Sole".....	1, 617	151			1, 617	151
Other.....	13	1			13	1
Grayfish.....	138, 357	604	118	1	138, 475	605
Groupers.....			14, 915	533	14, 915	533
Herring.....	11, 861	205			11, 861	205
Kingfish.....	2, 304	58			2, 304	58
"Lingcod".....	12	1			12	1
Mackerel.....	178, 415	2, 912			178, 415	2, 912
Marlin.....	4, 320	181	285	9	4, 605	190
Mullet.....	16, 278	746	2, 755	125	19, 033	871
Perch.....	867	18			867	18
Pilchard or sardine.....	544, 997	4, 072	66	1	545, 063	4, 073
Pompano.....			348	28	348	28
Rock bass.....	183, 746	7, 740	1, 274	74	185, 020	7, 814
Rockfishes.....	658, 015	23, 267	10, 769	460	668, 784	23, 727
Rudderfish.....	1, 215	55			1, 215	55
Sculpin.....	13, 561	800			13, 561	800
Sea bass:						
Black.....	160, 004	4, 909	92, 053	2, 674	252, 057	7, 583
White.....	91, 321	5, 640	58, 032	4, 151	149, 353	9, 791
Sheepshead.....	9, 591	293	205	6	9, 796	299
Skates.....	379	5			379	5
Smelt.....	30, 868	690			30, 868	690
Spanish mackerel.....			7, 613	375	7, 613	375
Swordfish.....	205, 668	19, 701	2, 202	247	207, 870	19, 948
Tuna and tunalike fishes:						
Bluefin.....	22, 719	1, 069	2, 992	180	25, 711	1, 249
Bonito.....	745, 837	12, 934	11, 056	214	756, 893	13, 148
Skipjack or striped tuna.....	347, 583	9, 388	12, 994, 143	452, 954	13, 341, 726	462, 342
Yellowfin.....	160, 829	6, 667	20, 686, 046	840, 079	20, 846, 875	846, 746
Whitefish.....	87, 794	3, 781	10, 262	522	98, 056	4, 303
Yellowtail.....	260, 305	6, 457	247, 633	8, 009	507, 938	14, 466
Other fish.....	22	1			22	1
Total.....	4, 416, 345	140, 827	34, 433, 628	1, 324, 316	38, 854, 973	1, 465, 143
SHELLFISH						
Sea crawfish or spiny lobster.....	64, 648	9, 147	674, 274	93, 251	738, 922	102, 398
Octopus.....	69	8			69	8
Squid.....	115	9			115	9
Turtles.....			5, 728	288	5, 728	288
Total.....	64, 832	9, 164	680, 002	93, 539	744, 834	102, 703
Grand total.....	4, 481, 177	149, 991	35, 118, 630	1, 417, 855	39, 599, 807	1, 567, 846

*Fisheries of California, 1932—Continued*

## CATCH: BY WATERS

Species	Off California <sup>1</sup>		Off Latin America	
	Pounds	Value	Pounds	Value
<b>FISH</b>				
Anchovies.....	299,217	\$3,374		
Barracuda.....	2,505,101	120,788	421,674	\$35,610
Cabrilla.....			340,008	11,898
Carp.....	29,500	438		
Catfish.....	254,027	27,570		
Cod.....	4,418,539	53,590		
Corbina.....			2,469	99
Eels.....	242	9		
Flounders:				
"California halibut".....	923,226	72,137	10,701	1,069
"Sole".....	8,888,942	310,691		
Other.....	1,234,465	42,604		
Flyingfish.....	40,535	1,366		
Grayfish.....	850,770	13,251	118	1
Grouper.....			18,689	646
Hake.....	28,751	407		
Halibut.....	661,603	29,788		
Hardhead.....	110,557	8,040		
Herring.....	765,724	4,985		
Horse mackerel.....	536,409	14,497		
Kingfish.....	447,531	10,903		
"Lingcod".....	899,912	24,959		
Mackerel.....	12,473,746	94,661		
Marlin.....	24,391	972	285	9
Mullet.....	19,935	951	2,775	125
Perch.....	206,477	9,169		
Pilchard or sardine.....	312,171,650	825,348	66	1
Pompano.....	5,557	2,067	4,076	513
Rock bass.....	431,768	21,209	4,796	274
Rockfish.....	5,625,540	170,814	10,769	460
Rudderfish.....	35,823	1,936		
Sablefish.....	975,373	20,203		
Salmon.....	4,699,120	161,740		
Sculpin.....	90,181	5,873		
Sea bass:				
Black.....	231,084	7,705	242,310	8,855
White.....	669,071	50,618	137,433	10,200
Shad.....	1,173,471	29,342		
Sheepshead.....	89,345	2,321	246	7
Skates.....	292,412	4,622		
Smelt.....	894,096	33,472		
Spanish mackerel.....			10,822	567
Splittail.....	24,420	650		
Squawfish.....	2,004	99		
Striped bass.....	537,376	45,883		
Suckers.....	6,525	52		
Swordfish.....	652,018	57,431	10,687	1,034
Tomcod.....	4,271	171		
Tuna and tunalike fishes:				
Albacore.....	619,694	31,062		
Bluefin.....	460,044	26,129	611,162	24,508
Bonito.....	1,711,422	30,692	1,150,864	22,773
Skipjack or striped tuna.....	375,042	10,349	21,261,535	741,150
Yellowfin.....	165,323	6,966	36,758,087	1,497,846
Whitebait.....	133,746	6,406		
Whitefish.....	149,491	7,399	12,536	654
Yellowtail.....	1,024,086	27,408	772,278	23,753
Other fish.....	148,973	2,457		
Total.....	369,019,529	2,435,574	61,784,366	2,382,052
<b>SHELLFISH</b>				
Crabs.....	2,434,132	201,733		
Sea crawfish or spiny lobster.....	319,307	45,061	699,340	97,337
Shrimp.....	2,682,789	40,512		
Abalone.....	563,469	77,386		
Clams:				
Cockle.....	36,722	8,636		
Pismo.....	27,576	7,297		
Razor.....	1,307	380		
Soft.....	61,410	13,978		
Mixed.....	158	45		
Mussels.....	23	13		
Octopus.....	21,187	1,472		
Oysters, market:				
Eastern.....	39,227	12,258		
Japanese.....	9,142	2,286		
Native.....	10,930	4,544		

<sup>1</sup> The catch of cod was taken in Alaska waters.

*Fisheries of California, 1932—Continued*

## CATCH: BY WATERS—Continued

Species	Off California		Off Latin America	
	Pounds	Value	Pounds	Value
Squid.....	4,229,743	\$30,514	5,728	\$288
Turtles.....				
Total.....	10,437,122	446,115	705,068	97,625
WHALE PRODUCTS				
Whale meat.....	434,000	9,765		
Whale oil.....	503,100	6,900		
Total.....	937,100	16,265		
Grand total.....	380,393,751	2,897,954	62,489,434	2,479,677

*Fisheries of the northern district of California, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Lines		Dip nets	Traps		Shovels and rakes	Total, exclusive of duplication
		Drift, salmon	Other	Set and hand	Troll		Crab	Octopus		
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....				14	13					18
On boats and shore.....	47	159	8	55	216	43	25	1	8	418
Total.....	47	159	8	69	229	43	25	1	8	436
Vessels: Motor.....				6	6					8
Net tonnage.....				46	43					60
Boats:										
Motor.....	14		5	31	187		22	1		195
Other.....	11	105	1							111
Apparatus:										
Number.....	25	105	6	197	829	43	414	5	8	
Length, yards.....	1,971									
Square yards.....		96,600	5,472							
Hooks.....				34,916	3,881					

## CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines			
					Set and hand		Troll	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
" Sole ".....					105	\$3		
Other.....	11,854	\$448			513	10		
Halibut.....					519,028	22,928	3,057	\$119
Herring.....	8,699	191						
" Lingcod ".....	102	2			116,808	2,587	21,620	287
Perch.....	18,361	556						
Pilchard or sardine.....	140	2						
Rockfishes.....					88,966	1,753	266	5
Sablefish.....					576,181	10,433		
Salmon.....	37,554	993	592,445	\$11,207			2,498,940	91,372
Sculpin.....					46	1		
Smelt.....	43,137	1,670	4,800	187				
Tomcod.....	28	1						
Tuna, and tunalike fishes, albacore.....							21	3
Whitebait.....	748	28	33	1				
Other fish.....					41,921	617	106	2
Total.....	120,623	3,891	597,278	11,395	1,343,568	38,332	2,524,010	91,788
SHELLFISH								
Octopus.....					120	5		
Grand total.....	120,623	3,891	597,278	11,395	1,343,688	38,337	2,524,010	91,788

*Fisheries of the northern district of California, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dip nets		Paranzella nets		Traps		Rakes and shovels	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>								
Flounders:								
" Sole "			5,082,478	\$177,887				
Other			392,300	14,412				
Grayfish			5,140	51				
Hake			10,143	152				
Halibut			123,743	5,556				
Kingfish			945	38				
" Lingcod "			326,904	6,538				
Perch	102	\$4	150	7				
Rockfishes			300,663	6,013				
Sablefish			42,351	847				
Skates			27,108	407				
Smelt	17,616	364						
Tomcod			2,591	104				
Whitebait	90,544	3,367						
Other fish			77,669	1,165				
Total	108,262	3,735	6,392,185	213,177				
<b>SHELLFISH</b>								
Crabs					116,458	\$9,165		
Clams:								
Cockle							74	\$13
Soft							7,948	1,284
Mussels							18	12
Octopus			15	1	1,597	106		
Oysters, market, native							647	260
Total			15	1	118,055	9,271	8,687	1,569
Grand total	108,262	3,735	6,392,200	213,178	118,055	9,271	8,687	1,569

NOTE.—The catch by paranzella nets was made entirely by fishermen from the San Francisco district.

*Fisheries of the San Francisco district of California, 1932*

## OPERATING UNITS: BY GEAR

Item	Lampara nets, sardine	Haul seines	Gill nets			
			Drift, salmon	Drift, sea bass	Drift, shad	Other
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels	79					2
On boats and shore	84	7	363	15	348	88
Total	163	7	363	15	348	90
Vessels:						
Motor	8					1
Net tonnage	91					7
Boats:						
Motor	12	2	186	8	181	49
Other		2	6		5	4
Apparatus:						
Number	20	3	192	8	186	88
Length, yards	5,678	660				
Square yards			571,392	15,091	507,854	133,545

*Fisheries of the San Francisco district of California, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Lines		Fyke nets	Bag nets, shrimp	Paran- zella nets	Dip nets
	Set and hand	Troll				
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	127	41		28	88	
On boats and shore.....	322	179	90	24		10
Total.....	449	220	90	52	88	10
<b>Vessels:</b>						
Motor.....	6	18		6	18	
Net tonnage.....	64	257		37	263	
Sail.....	3					
Net tonnage.....	1, 124					
Total vessels.....	9	18		6	18	
Total net tonnage.....	1, 188	257		37	263	
<b>Boats:</b>						
Motor.....	160	178	37	7		
Other.....	19		33			
<b>Apparatus:</b>						
Number.....	864	573	2, 268	13	9	10
Length, yards.....				8, 768		
Yards at mouth.....					150	
Hooks.....	59, 456	3, 289				

  

Item	Beam trawls	Traps, crab	Har- poons, whaling	Tongs	Shovels	Abalone outfits	Total, exclu- sive of dupli- cation
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			16				306
On boats and shore.....	27	229		21	78	2	1, 035
Total.....	27	229	16	21	78	2	1, 341
<b>Vessels:</b>							
Steam.....			2				2
Net tonnage.....			41				41
Motor.....							32
Net tonnage.....							384
Sail.....							3
Net tonnage.....							1, 124
Total vessels.....			2				37
Total net tonnage.....			41				1, 549
<b>Boats:</b>							
Motor.....	27	226		8		1	573
Other.....				12			67
<b>Apparatus:</b>							
Number.....	27	4, 460	2	21	78	1	
Yards at mouth.....	180						

*Fisheries of the San Francisco district of California, 1932—Continued*

## CATCH: BY GEAR

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>FISH</b>								
Anchovies.....			147,545	\$1,475	82	\$1		
Carp.....					19,643	236	5,258	\$108
Flounders:								
"California halibut".....								
Other.....			94	3	44	2	78	4
Grayfish.....			94	1			340	12
Halibut.....			86	6				
Hardhead.....					106,277	7,667		
Herring.....			62,047	422	310,660	1,553	354,218	2,424
Kingfish.....			4,321	161			52	2
"Lingcod".....			15	1			75	2
Mackerel.....			2,491	100			35	1
Perch.....			21,584	848	15,389	605	35,959	1,408
Pilchard or sardine.....	1,120,350	\$1,961	28,233,448	71,823			3,970	40
Rockfishes.....					102	4		
Salmon.....							1,269,700	43,524
Sea bass, white.....			305	30	1,113	108	7,727	752
Shad.....							1,173,355	29,338
Smelt.....			31,693	1,427	37,619	1,706	217,400	9,874
Splittail.....					10,700	214		
Squawfish.....							166	8
Striped bass.....							269,803	18,599
Suckers.....					6,210	45		
Tomcod.....			20	1			50	2
Whitebait.....			20,352	1,628	1,672	134	2,281	182
Other fish.....			14	1			679	12
<b>Total</b> .....	<b>1,120,350</b>	<b>1,961</b>	<b>28,524,109</b>	<b>77,917</b>	<b>509,511</b>	<b>12,275</b>	<b>3,341,146</b>	<b>106,292</b>

Species	Lines				Fyke nets		Bag nets	
	Set and hand		Troll					
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....	321	\$7			4, 278	\$87		
Catfish.....	110	12			253, 917	27, 558		
Cod.....	4, 418, 539	53, 590						
Eels.....	208	8						
Flounders:								
"Sole".....	5, 025	176						
Other.....	3, 596	180						
Grayfish.....	25, 775	258	70	\$1				
Hake.....	80	1						
Halibut.....	1, 099	83						
Hardhead.....	18	1			4, 262	372		
"Lingcod".....	219, 735	7, 691	2, 004	70				
Mackerel.....	530	21						
Perch.....	1, 864	73						
Rockfishes.....	462, 819	14, 611	106	3				
Sablefish.....	41, 427	1, 139						
Salmon.....			219, 581	8, 950				
Sculpin.....	3, 561	178						
Sea bass, white.....			67	6				
Smelt.....	20	1						
Splittail.....					13, 720	436		
Squawfish.....	310	15			1, 528	76		
Striped bass.....	267, 573	27, 284						
Suckers.....					315	7		
Other fish.....	2, 329	35			33	2		
Total.....	5, 454, 939	105, 364	221, 828	9, 030	278, 053	28, 538		
SHELLFISH								
Shrimp.....							1, 300, 416	\$19, 506
Octopus.....	1, 649	115						
Total.....	1, 649	115					1, 300, 416	19, 506
Grand total.....	5, 456, 588	105, 479	221, 828	9, 030	278, 053	28, 538	1, 300, 416	19, 506

NOTE.—The catch by purse seines was made entirely by fishermen from the Monterey and San Pedro districts.

*Fisheries of the San Francisco district of California, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Dip nets		Paranzella nets		Beam trawls		Traps	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
"California halibut"			311	\$23				
"Sole"			3,090,546	108,169				
Other			723,997	22,934				
Grayfish			190,295	1,903				
Hake			13,211	199				
Halibut			14,590	1,096				
Kingfish			541	19				
"Lingcod"			80,398	2,814				
Perch	70	\$3						
Rockfishes			200,167	7,000				
Sablefish			3,796	105				
Skates			205,272	3,079				
Smelt	1,736	156						
Tomcod			1,582	63				
Whitebait	4,012	293						
Other fish			14,825	222				
Total	5,818	452	4,539,531	147,626				
SHELLFISH								
Crabs			14,970	1,248			2,275,161	\$189,625
Shrimp					1,381,391	\$20,721		
Total			14,970	1,248	1,381,391	20,721	2,275,161	189,625
Grand total	5,818	452	4,554,501	148,874	1,381,391	20,721	2,275,161	189,625

Species	Harpoons		Tongs		Shovels		Abalone outfits	
SHELLFISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Abalone							25	\$5
Clams:								
Cockle					29,736	\$7,122		
Soft					53,462	12,694		
Mixed					154	44		
Oysters, market:								
Eastern			39,227	\$12,258				
Native			10,283	4,284				
Total			49,510	16,542	83,352	19,860	25	5
WHALE PRODUCTS								
Whalemeat	434,000	\$9,765						
Whale oil	503,100	6,500						
Total	937,100	16,265						
Grand total	937,100	16,265	49,510	16,542	83,352	19,860	25	5

*Fisheries of the Monterey district of California, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines, sardine	Lampara nets		Gill nets		
		Sardine	Squid	Drift, sea bass	Set, "California halibut"	Other
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels	233	254	90		2	
On boats and shore		211	232	29	37	97
Total	233	465	322	29	39	97
Vessels: Motor	22	21	14		1	
Net tonnage	915	238	140		7	
Boats:						
Motor		17	41	18	23	66
Other						7
Apparatus:						
Number	22	38	55	18	24	105
Length, yards	7,960	12,150	11,080			
Square yards				48,600	55,920	242,207

*Fisheries of the Monterey district of California, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Lines		Paran- zella nets	Traps	Rakes and shovels	Abalone outfits	Total, exclusive of dupli- cation
	Set and hand	Troll					
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	1	16	6	-----	-----	60	526
On boats and shore.....	190	198	12	7	41	10	627
Total.....	191	214	18	7	41	70	1,153
Vessels: Motor.....	1	10	1	-----	-----	12	53
Net tonnage.....	7	122	6	-----	-----	96	1,197
Boats:							
Motor.....	158	185	3	6	-----	2	219
Other.....	23	-----	-----	-----	-----	-----	24
Apparatus:							
Number.....	1,043	1,575	2	119	41	14	-----
Yards at mouth.....	-----	-----	33	-----	-----	-----	-----
Hooks.....	147,269	3,433	-----	-----	-----	-----	-----

## CATCH: BY GEAR

Species	Purse seines		Lampara nets		Gill nets	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
<b>FISH</b>						
Anchovies.....	-----	-----	118,628	\$1,254	1,415	\$15
Barracuda.....	-----	-----	25	2	2,943	191
Flounders:						
"California halibut".....	-----	-----	1,019	73	42,849	3,053
"Sole".....	-----	-----	183	7	6,244	231
Other.....	-----	-----	119	5	16,751	508
Grayfish.....	-----	-----	703	7	5,140	40
Herring.....	-----	-----	1,315	14	16,821	171
Horse mackerel.....	535	\$24	104,325	4,670	10,856	486
Kingfish.....	-----	-----	57,045	2,016	63,536	2,245
"Lingcod".....	-----	-----	309	12	3,814	143
Mackerel.....	1,006	20	218,700	4,374	281	6
Perch.....	-----	-----	40,676	1,545	13,976	531
Pilchard or sardine.....	128,162,280	308,082	40,110,326	114,005	11,695	117
Pompano.....	-----	-----	220	43	20	4
Rockfishes.....	-----	-----	1,609	52	679	21
Sculpin.....	-----	-----	-----	-----	665	8
Sea bass:						
Black.....	-----	-----	-----	-----	81	3
White.....	-----	-----	2,353	180	23,024	1,765
Shad.....	-----	-----	-----	-----	29	1
Skates.....	-----	-----	600	11	3,081	57
Smelt.....	810	30	29,915	1,128	127,843	4,818
Tuna and tunalike fishes:						
Bluefin.....	-----	-----	-----	-----	38	3
Bonito.....	-----	-----	10	1	21	1
Whitebait.....	-----	-----	7,935	435	6,156	337
Other fish.....	-----	-----	134	5	39	1
Total.....	128,164,631	308,156	40,696,149	129,839	357,998	14,756
<b>SHELLFISH</b>						
Crabs.....	-----	-----	42	2	27,266	1,679
Squid.....	-----	-----	4,075,262	26,994	12,359	267
Total.....	-----	-----	4,075,304	26,996	39,625	1,946
Grand total.....	128,164,631	308,156	44,771,453	156,835	397,623	16,702



*Fisheries of the Monterey district of California, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Lines				Paranzella nets	
	Set and hand		Troll			
FISH	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:	2,802	\$199	15	\$1	3,722	\$265
"California halibut".....	47,081	1,742			357,287	13,225
" Sole".....	16,989	544			59,061	1,868
Other.....	100	4			2,320	23
Grayfish.....					4,893	49
Hake.....	3,552	159				
Horse mackerel.....	15,064	532			4,810	170
Kingfish.....	107,643	4,049	192	7	18,310	689
••"Lingcod".....	445,871	8,917	61	1		
Mackerel.....	4,130	150			703	27
Perch.....	2,046,924	54,514			21,940	788
Rockfishes.....	218,853	4,478			10,953	224
Sablefish.....			80,884	5,692		
Salmon.....	246	3				
Sculpin.....	255	20				
Sea bass, white.....	7,256	136			18,239	340
Skates.....	29,893	1,130				
Smelt.....			606,313	30,211		
Tuna and tunalike fishes, albacore.....	13	1				
Whitebait.....	2,943	100			1,337	27
Other fish.....						
Total.....	2,949,615	76,678	687,465	35,912	503,575	17,695
SHELLFISH						
Crabs.....					90	5
Octopus.....	1,724	120				
Total.....	1,724	120			90	5
Grand total.....	2,951,339	76,798	687,465	35,912	503,665	17,700

Species	Traps		Rakes and shovels		Abalone outfits	
SHELLFISH	Pounds	Value	Pounds	Value	Pounds	Value
Shrimp.....	982	\$285				
Abalone.....					427,075	\$63,884
Clams:						
Cockle.....			13	\$2		
Pismo.....			6,289	1,443		
Mixed.....			4	1		
Octopus.....	15,830	1,097				
Oysters, Japanese, market.....			9,142	2,286		
Total.....	16,812	1,382	15,448	3,732	427,075	63,884

Species	Traps		Rakes and shovels		Abalone outfits	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH						
Shrimp.....	982	\$285				
Abalone.....					427,075	\$63,884
Clams:						
Cockle.....			13	\$2		
Pismo.....			6,289	1,443		
Mixed.....			4	1		
Octopus.....	15,830	1,097				
Oysters, Japanese, market.....			9,142	2,286		
Total.....	16,812	1,382	15,448	3,732	427,075	63,884

*Fisheries of the San Pedro district of California, 1932*

## OPERATING UNITS: BY GEAR

Item	Purse seines			Lampara nets			Haul seines
	Barra-cuda	Sardine	Tuna	Mack-erel	Sardine	Other	
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	224	571	594	291	228	5	
On boats and shore.....				16		26	2
Total.....	224	571	594	307	228	31	2
Vessels: Motor.....	24	56	59	31	21	1	
Net tonnage.....	718	2,425	2,616	365	479	7	
Boats:							
Motor.....				2		6	
Other.....							1
Apparatus:							
Number.....	24	56	59	33	21	7	1
Length, yards.....	10,581	21,726	32,718	13,651	9,652	2,220	214

*Fisheries of the San Pedro district of California, 1932—Continued*

## OPERATING UNITS: BY GEAR—Continued

Item	Gill nets			Trammel nets	Lines	
	Drift, baracuda	Set, sea bass	Other		Set and hand	Troll
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	23	21	5	23	570	6
On boats and shore.....	75	80	31	71	353	102
Total.....	98	101	36	94	923	108
Vessels: Motor.....	8	7	2	8	90	3
Net tonnage.....	46	74	14	51	3,573	47
Boats:						
Motor.....	29	33	17	27	240	83
Other.....		1	5	2	18	
Apparatus:						
Number.....	37	41	25	37	1,730	410
Square yards.....	361,280	180,072	25,935	281,163		
Hooks.....					282,729	430

Item	Paran- zella nets	Traps, lob- ster	Har- poons, sword- fish	Shovels and rakes	Aba- lone, outfits	Total, exclu- sive of dupli- cation
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	14	22	41		10	1,623
On boats and shore.....	16	162	64	58	1	641
Total.....	30	184	105	58	11	2,264
Vessels: Motor.....	4	10	12		2	199
Net tonnage.....	57	68	163		14	6,930
Boats:						
Motor.....	6	107	28		1	351
Other.....		9				25
Apparatus:						
Number.....	10	4,291	40	58	3	
Yards at mouth.....	167					

## CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Anchovies.....			31,547	\$629				
Barracuda.....	521,486	\$34,677	199,115	12,215			282,108	\$13,718
Flounders:								
“California halibut”.....	45	3	432	35			229	15
“Sole”.....			13	1			50	3
Other.....							19	1
Flyingfish.....	135	4	419	13			39,981	1,349
Grayfish.....	3,740	119	1,975	43			51,251	1,018
Herring.....							103	5
Horse mackerel.....	29,737	660	384,668	8,414			1,494	56
Kingfish.....			158,276	3,002			50	1
Mackerel.....	132,800	649	10,085,448	50,143			38,600	781
Mullet.....			1,047	59	144	\$7	2,466	139
Perch.....	727	44	42,787	2,796			6,749	409
Pilchard or sardine.....	75,892,770	216,983	38,091,176	108,256	60	1	438	6
Pompano.....	14	6	5,303	2,014				
Rock bass.....	6,212	325	21,906	1,047			4,233	237
Rockfishes.....	635	30	1,124	40			114	5
Rudderfish.....	2,110	104	11,322	533			20,641	1,164
Sculpin.....	100	5					101	8
Sea bass:								
Black.....	294	12	2,003	74			8,517	324
White.....	141,276	9,240	47,145	4,362			338,508	27,203
Shad.....			87	3				
Sheepshead.....	30	1					1,412	35
Smelt.....	605	17	208,032	6,636	36,225	684	74,315	2,890

## Fisheries of the San Pedro district of California, 1932—Continued

## CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Purse seines		Lampara nets		Haul seines		Gill nets	
FISH—continued								
Tuna and tunalike fishes:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bluefin.....	375,824	\$21,407	61,408	\$3,646	-----	-----	33	\$3
Bonito.....	513,039	9,547	399,488	7,368	-----	-----	4,720	80
Yellowfin.....	21	1	23	2	-----	-----	-----	-----
Whitefish.....	57	2	63	4	-----	-----	368	17
Yellowtail.....	366,815	10,769	279,846	6,566	-----	-----	7,415	236
Other fish.....	60	2	737	29	-----	-----	601	18
Total.....	77,988,532	304,607	50,035,390	217,930	36,429	\$692	884,516	49,721
SHELLFISH								
Sea crawfish or spiny lobster.....	14	3	-----	-----	-----	-----	4	1
Squid.....	6,053	241	135,946	3,002	-----	-----	-----	-----
Total.....	6,067	244	135,946	3,002	-----	-----	4	1
Grand total.....	77,994,599	304,851	50,171,336	220,932	36,429	692	884,520	49,722

Species	Trammel nets		Lines				Paranzella nets	
			Set and hand		Troll			
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Barracuda.....			784,670	\$28,201		\$8,907		
Eels.....			34	1				
Flounders:								
"California halibut".....	439,662	\$35,950	23,083	1,711			339,390	\$25,201
"  Sole".....	11,583	469	2,550	98			284,180	8,529
Other.....	237	12	7,918	1,631			620	33
Grayfish.....	48,957	1,045	368,025	7,944	1,581	31	7,247	159
Hake.....			424	6				
Horse mackerel.....			1,242	28				
Kingfish.....			140,450	2,666				
"Lingcod".....	14	1	1,957	65				
Mackerel.....			1,369,367	26,733	141	3		
Marlin.....			2,724	92				
Perch.....			2,249	137				
Rock bass.....	394	26	166,353	9,216	479	25	863	70
Rockfishes.....	126	5	1,837,733	62,552			3,368	145
Rudderfish.....			1,538	80				
Sablefish.....			81,543	2,966			269	11
Salmon.....					16	2		
Sculpin.....	80	5	71,270	4,823			171	14
Sea bass:								
Black.....	2,173	88	57,624	2,280			388	15
White.....	555	47	15,368	1,261	47	3	7	1
Sheepshead.....	5,470	138	26,756	690				
Skates.....	5,359	103	6,678	125			18,418	358
Smelt.....			1,569	64				
Swordfish.....			2,766	235				
Tuna, and tunalike fishes:								
Albacore.....			4,801	304	8,559	544		
Bluefin.....	22	1						
Bonito.....			46,236	730	2,071	31		
Skipjack or striped tuna.....			27,278	955	181	6		
Yellowfin.....			4,450	296				
Whitefish.....	112	6	60,224	3,539				
Yellowtail.....	424	12	101,497	3,146	7,784	222		
Other fish.....	199	6	5,313	211				
Total.....	515,367	37,914	5,223,690	162,786	267,355	9,774	654,921	34,536
SHELLFISH								
Sea crawfish or spiny lobster.....	8,788	1,379					346	41
Octopus.....	5	1	32	4				
Squid.....	8	1						
Total.....	8,801	1,381	32	4			346	41
Grand total.....	524,168	39,295	5,223,722	162,790	267,355	9,774	655,267	34,577

*Fisheries of the San Pedro district of California, 1932—Continued*

## CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Traps		Harpoons		Shovels and rakes		Abalone outfits	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Kingfish.....	137	\$3						
Marlin.....			17,347	\$699				
Perch.....	134	8						
Rock bass.....	47,582	2,523						
Rockfishes.....	184	6						
Sculpin.....	379	28						
Sheepshead.....	46,086	1,164						
Skates.....	22	1						
Swordfish.....			443,584	37,495				
Whitefish.....	873	50						
Other fish.....	12	1						
Total.....	95,409	3,784	460,931	38,194				
SHELLFISH								
Crabs.....	145	9						
Sea crawfish or spiny lobster.....	245,507	34,490						
Abalone.....							136,369	\$13,497
Clams:								
Cockle.....					6,899	\$1,499		
Pismo.....					21,287	5,854		
Razor.....					1,307	380		
Mussels.....					5	1		
Octopus.....	146	15						
Total.....	245,798	34,514			29,498	7,734	136,369	13,497
Grand total.....	341,207	38,298	460,931	38,194	29,498	7,734	136,369	13,497

## CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Haul seines		Gill nets	
FISH	Pounds	Value	Pounds	Value	Pounds	Value
Barracuda.....	370,551	\$31,226			845	\$65
Cabrilla.....	1,317	52				
Flounders, "California halibut".....	1,190	84			338	13
Pompano.....	488	64	3,240	\$421		
Rock bass.....	998	51			135	7
Sea bass:						
Black.....	20,856	752			2,960	81
White.....	45,948	3,155			25,253	2,099
Tuna and tunalike fishes:						
Bluefin.....	608,170	24,328				
Bonito.....	1,139,808	22,559				
Skipjack or striped tuna.....	2,028,316	70,992				
Yellowfin.....	7,028,351	289,648				
Whitefish.....	509	31				
Yellowtail.....	349,635	9,011			548	18
Total.....	11,596,137	451,953	3,240	421	30,099	2,283
SHELLFISH						
Sea crawfish or spiny lobster.....			25,066	\$4,086		
Grand total.....	5,707,777	602,292	25,066	4,086	8,485	787

*Fisheries of the San Diego district of California, 1932*

## OPERATING UNITS: BY GEAR

Item	Lampara nets, sardine	Gill nets			Trammel nets	Lines		Traps, lobster	Harpoons, swordfish and turtle	Total, exclusive of duplication
		Drift, barracuda	Set, sea bass	Other		Set and hand	Troll			
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....	33	6	6	3	12	734	3	23	50	742
On boats and shore.....	21	40	26	11	23	147	34	63	29	201
Total.....	54	46	32	14	35	881	37	86	79	943
Vessels: Motor.....	6	2	2	1	4	90	1	7	11	93
Net tonnage.....	57	12	12	13	34	5,138	5	70	175	5,160
Boats:										
Motor.....	4	16	12	9	9	76	30	47	13	119
Other.....				1		2	2	2		4
Apparatus:										
Number.....	10	18	14	14	13	1,298	170	1,938	24	
Length, yards.....	2,380									
Square yards.....		182,010	79,981	13,290	227,624					
Hooks.....						87,265	170			

## CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara nets		Gill nets		Trammel nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Barracuda.....					118,586	\$7,793		
Flounders:								
"California halibut".....					29	2	67,355	\$5,468
"Sole".....							38	4
Grayfish.....					48,228	188	61,439	271
Herring.....					11,861	205		
Kingfish.....					213	5		
"Lingcod".....							12	1
Mackerel.....					9,774	269		
Mullet.....			158	\$7	16,120	739		
Perch.....			867	18				
Pilchard or sardine.....			544,932	4,071	65	1		
Rock bass.....					712	19	58	3
Rockfishes.....					155	6	69	3
Rudderfish.....					1,215	55		
Sculpin.....					125	8		
Sea bass:								
Black.....					2,092	65	480	22
White.....					73,140	4,475	1,030	91
Sheepshead.....							127	4
Skates.....							257	3
Smelt.....			622	32	30,246	658		
Tuna and tunalike fishes:								
Bluefin.....	11,922	\$529	10,797	540				
Bonito.....					10,322	259		
Yellowtail.....					4,270	234		
Total.....	11,922	529	557,376	4,668	327,153	14,981	130,865	5,870
SHELLFISH								
Sea crawfish or spiny lobster.....							1,918	271
Squid.....			115	9				
Total.....			115	9			1,918	271
Grand total.....	11,922	529	557,491	4,677	327,153	14,981	132,783	6,141

NOTE.—The catch by purse seines was made entirely by fishermen from the San Pedro district.

*Fisheries of the San Diego district of California, 1932—Continued*

## CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll		Pounds	Value	Pounds	Value
<b>FISH</b>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Barracuda.....	305, 601	\$12, 278	44, 071	\$2, 806				
Flounders:								
"California halibut".....	2, 205	134						
"Sole".....	1, 531	143			48	\$4		
Other.....	13	1						
Grayfish.....	28, 690	145						
Kingfish.....	874	22			1, 217	31		
Mackerel.....	168, 641	2, 643						
Marlin.....							4, 320	\$181
Rock bass.....	50, 163	1, 567	51	3	132, 762	6, 148		
Rockfishes.....	653, 435	23, 084			4, 356	174		
Sculpin.....	12, 966	762			470	30		
Sea bass:								
Black.....	157, 432	4, 822						
White.....	16, 779	1, 039	372	35				
Sheepshead.....	1, 066	33			8, 398	256		
Skates.....	62	1			60	1		
Swordfish.....							205, 668	19, 701
Tuna and tunalike fishes:								
Bonito.....	728, 155	12, 529	7, 360	146				
Skipjack or striped tuna.....	347, 448	9, 384	135	4				
Yellowfin.....	159, 716	6, 621	1, 113	46				
Whitefish.....	87, 794	3, 781						
Yellowtail.....	251, 421	6, 085	4, 614	138				
Other fish.....	22	1						
Total.....	2, 974, 014	85, 075	57, 716	3, 178	147, 311	6, 644	209, 988	19, 882
<b>SHELLFISH</b>								
Sea crawfish or spiny lobster.....					62, 730	8, 876		
Octopus.....	69	8						
Total.....	69	8			62, 730	8, 876		
Grand total.....	2, 974, 083	85, 083	57, 716	3, 178	210, 041	15, 520	209, 988	19, 882

## CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Lampara nets		Gill nets		Trammel nets	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
<b>FISH</b>								
Barracuda.....					3, 004	\$240		
Flounders, "California halibut".....					26	2	9, 055	\$963
Grayfish.....					118	1		
Mullet.....			1, 665	\$70	1, 090	55		
Pilchard or sardine.....			66	1				
Pompano.....			348	28				
Rockfishes.....					186	4		
Sea bass:								
Black.....					4, 259	167	2, 361	113
White.....					45, 016	3, 250		
Tuna and tunalike fishes:								
Bluefin.....			2, 992	180				
Bonito.....			1, 210	24	17	1		
Skipjack or striped tuna.....	1, 905	\$67						
Yellowfin.....	371, 287	15, 637						
Whitefish.....					85	3		
Yellowtail.....	17, 557	702			1, 633	38		
Total.....	390, 749	16, 406	6, 281	303	55, 434	3, 761	11, 416	1, 076

NOTE.—The catch by purse seines was made entirely by fishermen from the San Pedro district.

*Fisheries of the San Diego district of California, 1932—Continued*

## CATCH OFF LATIN AMERICA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll					
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Barracuda.....	28, 144	\$2, 178	18, 521	\$1, 844				
Cabrilla.....	237, 019	8, 440						
Flounders, " California halibut "	92	7					285	\$9
Groupers.....	14, 915	533						
Marlin.....								
Rock bass.....	1, 194	68	80	6				
Rockfishes.....	10, 583	456						
Sea bass:								
Black.....	85, 433	2, 394						
White.....	12, 763	876	253	25				
Sheepshead.....	205	6						
Spanish mackerel.....	7, 613	375						
Swordfish.....							2, 202	247
Tuna and tunalike fishes:								
Bonito.....	9, 829	189						
Skipjack or striped tuna.....	12, 992, 238	452, 887						
Yellowfin.....	20, 309, 024	824, 213	5, 735	229				
Whitefish.....	10, 177	519						
Yellowtail.....	226, 339	7, 132	2, 104	137				
Total.....	33, 945, 568	1, 300, 273	26, 693	2, 241			2, 487	256
SHELLFISH								
Sea crawfish or spiny lobster.....					674, 274	\$93, 251		
Turtles.....							5, 728	288
Total.....					674, 274	93, 251	5, 728	288
Grand total.....	33, 945, 568	1, 300, 273	26, 693	2, 241	674, 274	93, 251	8, 215	544

HALIBUT FISHERY OF THE PACIFIC COAST<sup>10</sup>

The halibut fishery of the Pacific coast, which is prosecuted by United States (including Alaska) and Canadian vessels, ranks as one of the foremost fisheries of that section. During 1932, the total catch by vessels of both nationalities amounted to 43,458,000 pounds, valued at \$1,740,000. This is an increase of 1 percent in amount, but a decrease of 39 percent in value as compared with the catch and its value in 1931. Of the total catch in 1932, 85 percent was taken by United States craft and 15 percent by Canadian craft. Considered according to ports of landing, 39 percent was landed at Canadian ports, 50 percent at ports in the State of Washington, and 11 percent at ports in Alaska.

<sup>10</sup> These statistics were compiled from data collected by the International Fisheries Commission for Washington and British Columbia, and by Bureau agents for Alaska. The data for the Washington and Alaska landings as well as those landings made by United States craft in British Columbia are based on actual weight of the fares. In previous data "hailing-fares" were used for British Columbia.

*Halibut fishery of the Pacific coast, 1932*

## UNITED STATES OPERATING UNITS: By FLEET CLASSIFICATION

Item	Washington fleet	Alaska fleet	Total
Regular halibut vessels:			
Number.....	125	78	203
Net tonnage.....	3,614	1,490	5,104
Crew.....	920	405	1,325
Dories.....	146	78	224
Skates of lines.....	3,978	1,978	5,956
Vessels in other fisheries but landing one or more fares of halibut:			
Number.....	18	28	46
Net tonnage.....	287	400	687
Crew.....	83	111	194
Dories.....	15	24	39
Skates of lines.....	405	620	1,025
Regular halibut boats:			
Number.....		19	19
Crew.....		47	47
Skates of lines.....		340	340
Boats in other fisheries but landing one or more fares of halibut:			
Number.....	5	88	93
Crew.....	8	142	150
Skates of lines.....	30	572	602

## CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
WASHINGTON FLEET								
Regular vessels:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Halibut.....	19,891,191	\$911,831	3,022,197	\$120,655	206,687	\$6,671	23,120,075	\$1,039,157
Sablefish.....	1,631,729	40,721					1,631,729	40,721
"Lingcod".....	326,622	9,695					326,622	9,695
Rockfishes.....	212,534	6,359					212,534	6,359
Total.....	22,062,076	968,606	3,022,197	120,655	206,687	6,671	25,290,960	1,095,932
Other vessels and boats:								
Halibut.....	376,256	16,289					376,256	16,289
Sablefish.....	24,753	466					24,753	466
"Lingcod".....	47,627	1,211					47,627	1,211
Rockfishes.....	13,144	502					13,144	502
Total.....	461,780	18,468					461,780	18,468
ALASKA FLEET								
Regular vessels:								
Halibut.....	1,480,900	64,626	7,159,773	279,921	2,892,001	83,736	11,532,674	428,283
Sablefish.....	34,923	835			3,357	63	38,280	898
"Lingcod".....	4,703	89					4,703	89
Rockfishes.....	4,971	95			3,469	69	8,440	164
Total.....	1,525,497	65,645	7,159,773	279,921	2,898,827	83,868	11,584,097	429,434
Other vessels and boats:								
Halibut.....	92,601	2,888	462,721	17,636	1,464,300	44,245	2,019,622	64,769
Sablefish.....					1,035	21	1,035	21
Total.....	92,601	2,888	462,721	17,636	1,465,335	44,266	2,020,657	64,790
COMBINED FLEETS								
Regular vessels:								
Halibut.....	21,372,091	976,457	10,181,970	400,576	3,098,688	90,407	34,652,749	1,467,440
Sablefish.....	1,666,652	41,556			3,357	63	1,670,009	41,619
"Lingcod".....	331,325	9,784					331,325	9,784
Rockfishes.....	217,505	6,454			3,469	69	220,974	6,523
Total.....	23,587,573	1,034,251	10,181,970	400,576	3,105,514	90,539	36,875,057	1,525,366



*Halibut fishery of the Pacific coast, 1932—Continued*

## CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS—Continued

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
COMBINED FLEETS—CON.								
Other vessels and boats:	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Halibut.....	468,857	\$19,177	462,721	\$17,636	1,464,300	\$44,245	2,395,878	\$81,058
Sablefish.....	24,753	466	-----	-----	1,035	21	25,788	487
"Lingcod".....	47,627	1,211	-----	-----	-----	-----	47,627	1,211
Rockfishes.....	13,144	502	-----	-----	-----	-----	13,144	502
Total.....	554,381	21,356	462,721	17,636	1,465,335	44,266	2,482,437	83,258
All vessels and boats:								
Halibut.....	21,840,948	995,634	10,644,691	418,212	4,562,988	134,652	37,048,627	1,548,498
Sablefish.....	1,691,405	42,022	-----	-----	4,392	84	1,695,797	42,106
"Lingcod".....	378,952	10,995	-----	-----	-----	-----	378,952	10,995
Rockfishes.....	230,649	6,956	-----	-----	3,469	69	234,118	7,025
Grand total.....	24,141,954	1,055,607	10,644,691	418,212	4,570,849	134,805	39,357,494	1,608,624

## CATCH OF HALIBUT: BY UNITED STATES AND CANADIAN VESSELS AND BOATS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Fleet classification	Landed in—						Total	
	Washington		British Columbia		Alaska			
WASHINGTON FLEET	<i>Quantity</i>	<i>Value</i>	<i>Quantity</i>	<i>Value</i>	<i>Quantity</i>	<i>Value</i>	<i>Quantity</i>	<i>Value</i>
Regular halibut vessels.....	19,891	912	3,022	120	207	7	23,120	1,039
Other vessels and boats.....	376	16					376	16
Total.....	20,267	928	3,022	120	207	7	23,496	1,055
ALASKA FLEET								
Regular halibut vessels.....	1,481	64	7,160	280	2,892	84	11,533	428
Other vessels and boats.....	93	3	463	18	1,464	44	2,020	65
Total.....	1,574	67	7,623	298	4,356	128	13,553	493
COMBINED FLEET								
Regular halibut vessels.....	21,372	976	10,182	400	3,099	91	34,653	1,467
Other vessels and boats.....	469	19	463	18	1,464	44	2,396	81
Total.....	21,841	995	10,645	418	4,563	135	37,049	1,548
British Columbia fleet.....			6,409	192			6,409	192
Grand total.....	21,841	995	17,054	610	4,563	135	43,458	1,740

<sup>1</sup> Estimated.

NOTE.—In addition to the above it is estimated that about 500,000 pounds of halibut livers, valued at about \$60,000 were landed at Pacific coast ports during 1932.

## VESSEL FISHERIES AT SEATTLE, WASH.

A total of 42,266,096 pounds of fishery products, valued at \$1,797,611, were handled by Seattle wholesale dealers, exclusive of quantities received by transporting vessels or by rail from Alaska or Canada. This represents an increase of 4 percent in quantity, but a decrease of 22 percent in value as compared with the quantity of products handled and its value for the previous year. Of the total quantity handled, 24,141,954 pounds, valued at \$1,055,607, were landed by

fishing vessels, an increase of 40 percent in quantity but a decrease of 10 percent in value as compared with the previous year. Receipts by wholesale dealers from sources other than Alaska or Canada or from vessels in the halibut fleet, amounted to 18,124,142 pounds, valued at \$742,004, which was a decrease of 23 percent in quantity and 35 percent in value as compared with the previous year.

*Fishery products landed by United States vessels at Seattle, Wash., 1932* <sup>1</sup>

BY FISHING GROUNDS

Fishing grounds	Trips	Halibut				Sablefish	
		No. 1		No. 2			
	<i>Number</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
West of Cape Spencer.....	382	7,306,517	\$409,454	5,626,290	\$185,293	15,693	\$300
South of Cape Spencer.....	814	2,989,426	199,029	5,918,715	201,858	1,675,712	41,722
Total.....	1,196	10,295,943	608,483	11,545,005	387,151	1,691,405	42,022

Fishing grounds	"Lingcod"		Rockfishes		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
West of Cape Spencer.....	4,636	\$68	5,457	\$113	12,958,593	\$595,228
South of Cape Spencer.....	374,316	10,927	225,192	6,843	11,183,361	460,379
Total.....	378,952	10,995	230,649	6,956	24,141,954	1,055,607

<sup>1</sup> Halibut fleet.

BY MONTHS

Months	Trips	Halibut				Sablefish	
		No. 1		No. 2			
	<i>Number</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
January.....	9						
February.....	28	181,987	\$19,856	85,141	\$6,800	3,571	\$132
March.....	146	1,568,627	88,369	1,004,273	30,790	19,340	535
April.....	149	1,238,369	81,732	1,255,860	49,481	17,469	652
May.....	159	1,266,356	67,244	1,680,630	51,595	58,363	2,238
June.....	142	1,219,566	67,929	1,450,513	42,935	234,715	7,616
July.....	104	906,650	51,316	1,109,971	35,852	238,062	6,086
August.....	121	1,167,319	59,767	1,774,882	50,229	147,141	3,721
September.....	129	991,887	61,799	1,223,285	44,291	408,976	9,894
October.....	156	1,201,929	72,879	1,509,487	53,450	460,566	9,271
November.....	45	553,253	37,592	450,963	21,728	103,202	1,877
December.....	8						
Total.....	1,196	10,295,943	608,483	11,545,005	387,151	1,691,405	42,022

Months	"Lingcod"		Rockfishes		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
January.....	28,900	\$1,849	17,270	\$1,138	46,170	\$2,987
February.....	64,760	2,141	28,690	1,259	364,149	30,188
March.....	18,694	527	9,367	341	2,620,301	120,562
April.....	44,395	835	15,452	494	2,571,545	133,194
May.....	37,488	648	26,523	542	3,069,360	122,267
June.....	24,872	468	12,967	274	2,942,633	119,222
July.....	12,311	234	19,536	380	2,286,530	93,868
August.....	17,964	310	23,678	470	3,130,984	114,497
September.....	24,682	501	21,525	427	2,670,355	116,912
October.....	29,461	589	26,290	538	3,227,733	136,727
November.....	19,674	574	6,411	195	1,133,503	61,966
December.....	55,751	2,319	22,940	898	78,691	3,217
Total.....	378,952	10,995	230,649	6,956	24,141,954	1,055,607

*Fishery products received by Seattle wholesale dealers, 1932<sup>1</sup>*

## BY MONTHS

Species	January		February		March		April		May	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:										
"Sole"-----	32,721	\$628	55,528	\$1,386	45,900	\$1,196	23,471	\$512	22,190	\$476
Other-----	7,473	117	4,000	50	2,938	80	1,200	15	635	6
Halibut-----					85	3	3,411	170	5,742	225
Herring-----	500	5			10,000	50				
"Lingcod"-----	5,073	233	13,190	404	2,961	77	12,373	249	6,939	132
Perch-----	4,335	173	5,090	197	5,109	179	7,141	125	3,228	93
Rockfishes-----	6,812	281	21,896	837	4,092	126	10,450	224	8,067	240
Salmon:										
Blueback, red or sockeye-----									1,029	71
Chinook or king-----			1,391	195	56,098	7,407	239,072	21,351	1,285,586	69,951
Chum or keta-----									76	1
Silver or coho-----									23,379	909
Smelt-----	4,716	292	10,950	110	10,606	318			5,687	445
Steelhead trout-----	5,113	511	10,617	1,274	1,992	199			14,137	766
Sturgeon-----	238	29	79	10	184	20			95	12
Crabs-----	67,038	3,215	77,616	4,143	70,588	3,744	80,260	4,497	125,571	7,021
Octopus-----	5,963	233	5,172	155	3,349	86	6,894	248	5,757	105
Total-----	139,983	5,717	205,529	8,761	213,872	13,485	384,272	27,391	1,508,118	80,453

Species	June		July		August		September	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
"Sole"-----	22,225	\$439	12,025	\$285	5,870	\$148	15,550	\$294
Other-----	220	1					140	1
Halibut-----	22,683	900	33,628	1,315	56,307	1,761	2,210	128
"Lingcod"-----	8,712	114	7,277	96	2,181	31	1,318	21
Perch-----	129	4	1,034	39	2,732	72	5,889	120
Rockfishes-----	5,660	110	7,561	252	3,622	109	3,863	95
Sablefish-----	635	20						
Salmon:								
Blueback, red or sockeye-----	8,860	532	4,828	245	6,720	403	1,264	76
Chinook or king-----	2,202,345	126,475	2,083,147	110,633	1,528,587	87,515	347,742	18,227
Chum or keta-----	253	3	450	9	30,454	456	141,002	2,098
Humpback or pink-----			105	3	6,585	66	440	5
Silver or coho-----	192,512	8,255	529,418	21,009	1,111,877	44,474	967,258	30,098
Smelt-----	14,589	460	27,850	910	23,930	661	42,689	1,328
Steelhead trout-----	13,310	567	9,117	457	15,267	452	12,018	459
Sturgeon-----	443	44			1,193	60	515	26
Crabs-----	58,544	3,414	51,198	3,047	29,922	1,641	8,348	557
Octopus-----	3,727	112	3,309	100	852	26	5,429	109
Total-----	2,554,847	141,450	2,770,947	138,400	2,826,099	137,875	1,555,675	53,642

Species	October		November		December		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
"Sole"-----	25,371	\$633	26,656	\$587	48,739	\$1,311	336,246	\$7,895
Other-----			490	5	4,102	58	21,198	333
Halibut-----	1,227	75	290	18			125,583	4,595
Herring-----			10,490	157	9,153	171	30,143	383
"Lingcod"-----	1,626	39	2,532	51	16,921	1,041	81,103	2,488
Perch-----	3,397	68	4,470	112	4,326	134	46,881	1,316
Rockfishes-----	6,879	207	3,958	116	22,000	1,000	104,860	3,597
Sablefish-----	4,605	138					5,240	158
Salmon:								
Blueback, red or sockeye-----							22,701	1,327
Chinook or king-----	68,884	3,507	11,522	507			7,824,374	445,768
Chum or keta-----	2,283,525	31,908	1,216,485	10,900	1,730	107	3,673,975	45,482
Humpback or pink-----							7,130	74
Silver or coho-----	1,495,141	50,539	206,906	6,207	74,317	3,902	4,600,808	165,393
Smelt-----	21,912	736	18,770	872	9,635	498	191,334	6,630
Steelhead trout-----	1,962	65	14,159	708	15,742	945	113,434	6,403
Sturgeon-----	175	11			30	2	2,952	214
Crabs-----	102,964	4,741	90,400	4,872	113,520	7,326	875,939	48,218
Octopus-----	5,050	51	6,674	133	8,065	372	60,241	1,730
Total-----	4,022,718	92,718	1,613,802	25,245	328,280	16,867	18,124,142	742,004

<sup>1</sup> This tabulation does not include fish received from Alaska or Canada or vessels in the halibut fleet.<sup>2</sup> 41,663 dozen.

LAKE FISHERIES <sup>11</sup>

The yield of the United States fisheries of the Great Lakes including the international lakes of northern Minnesota during 1932, amounted to 83,744,389 pounds, valued at \$4,331,776 to the fishermen, representing a decrease of 9 percent in quantity and 28 percent in value as compared with the catch in the previous year. These fisheries gave employment to 6,932 fishermen or 1 percent more than in 1931.

*Lake fisheries of the United States and Canada, 1932*

## CATCH: BY LAKES

Species	Lake Ontario			Lake Erie		
	United States	Canada	Total	United States	Canada	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Blue pike.....	80,785	91,900	172,685	9,866,679	3,962,100	13,828,779
Bowfin.....				184	(1)	184
Burbot.....	20,343	(1)	20,343	251,521	(1)	251,521
Carp.....	54,457	49,900	104,357	2,878,130	510,800	3,388,930
Catfish and bullheads.....	66,137	201,400	267,537	622,293	83,300	705,593
Cisco.....				160,215	851,200	1,011,415
Eels.....	43,536	50,100	93,636			
Goldfish.....				48,533	(1)	48,533
Lake herring.....	72,793	651,400	724,193			
Lake trout.....	18,286	301,600	319,886	9,740	1,800	11,540
Mooneye.....				15,684	(1)	15,684
Pike or pickerel (jacks).....	14,853	170,200	185,053	7,603	55,200	62,803
Rock bass.....	1,092	(1)	1,092	5,890	(1)	5,890
Sauger.....				3,142,213	(1)	3,142,213
Sheepshead.....				2,144,323	(1)	2,144,323
Sturgeon.....	11,627	2,530	14,157	16,901	28,142	45,043
Sucker "mullet".....	35,585	(1)	35,585	1,325,253	(1)	1,325,253
Sunfish.....	8,084	(1)	8,084			
White bass.....				252,695	(1)	252,695
Whitefish, common.....	54,635	418,300	472,935	1,168,570	912,200	2,080,770
Yellow perch.....	27,044	98,100	125,144	9,733,201	5,029,000	14,762,201
Yellow pike.....	12,022	16,000	28,022	2,020,057	296,900	2,316,957
Miscellaneous.....		204,700	204,700		1,003,000	1,003,000
Total.....	521,279	2,256,130	2,777,409	33,669,685	12,733,642	46,403,327

<sup>1</sup> Where there has been a Canadian catch of these species it is included under Miscellaneous.

<sup>11</sup> The statistics of the catch presented herewith were obtained principally from the records of the various State fishery agencies and from the Dominion Bureau of Statistics, Ottawa, Canada. The data for the operating units (fishermen, vessels, boats, and gear) of the United States were obtained largely by Bureau agents in a special canvass; although State records in several instances were very helpful in this work. In all cases the statistics collected are for the calendar year, except for Lake of the Woods, Rainy Lake, and Lake Namakan in Minnesota, which are for 2 seasons. For Lake of the Woods the seasons are from June 1 to Nov. 1 and Dec. 1 to Apr. 1 and for Rainy and Namakan Lakes from May 15 to Nov. 1 and Dec. 1 to Apr. 1. The catches for these 2 seasons, in the order named, have been combined to constitute a year. The quantity of fish taken in these lakes between Jan. 1 and Apr. 1 is estimated at less than 3 percent of the total catch.

*Lake fisheries of the United States and Canada, 1932—Continued*

## CATCH: BY LAKES—Continued

Species	Lake Huron			Lake Michigan	Lake Superior		
	United States	Canada	Total	United States	United States	Canada	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Blue pike.....		2,000	2,000				
Bowfin.....	2,764	(1)	2,764				
Buffalofish.....				1,910			
Burbot.....	692	(1)	692	55,154	3,361	(1)	3,361
Carp.....	1,055,068	55,800	1,110,868	283,895	5,149	1,100	6,249
Catfish and bullheads.....	80,166	6,700	86,866	55,356			
Chubs.....	507,121	1,421,900	1,929,021	3,129,108	392,413	205,000	597,413
Lake herring.....	2,646,662	366,400	3,013,062	2,941,084	6,025,835	757,100	6,782,935
Lake trout.....	2,220,624	2,968,400	5,189,024	5,491,780	2,920,594	1,123,700	4,044,294
Pike or pickerel (jacks).....	33,194	189,900	223,094	33,387	63,933	15,100	79,033
Rock bass.....	8,455	(1)	8,455	2,063			
Sauger.....	67,878	(1)	67,878	16,015	5,575	(1)	5,575
Sheepshead.....	1,925	(1)	1,925	12,245	11	(1)	11
Smelt.....				97,807			
Steelhead trout.....				5,050			
Sturgeon.....		17,331	17,331			2,800	2,800
Sucker "mullet".....	2,592,791	(1)	2,592,791	1,909,402	208,458	(1)	208,458
Whitefish:							
Common.....	4,332,874	1,582,000	5,914,874	3,557,604	450,569	(1)	450,569
Menominee.....	30,006	(1)	30,006	127,187	75,481	(1)	75,481
Yellow perch.....	700,094	39,800	739,894	953,609	16,922	(1)	16,922
Yellow pike.....	1,568,044	406,000	1,974,044	105,107	4,890	116,900	121,790
Crawfish.....				19,677			
Mussel shells.....				1,894,914			
Miscellaneous.....		423,000	423,000			72,700	72,700
Total.....	15,848,358	7,479,231	23,327,589	20,692,354	10,173,191	2,294,400	12,467,591

Species	Namakan Lake			Rainy Lake		
	United States	Canada	Total	United States	Canada	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Chubs.....	18,437	(1)	18,437	9,433	4,625	14,058
Crappie.....	781	(1)	781			
Pike or pickerel (jacks).....	31,200	1,070	32,270	37,822	135,683	173,505
Sturgeon.....		1,070	1,070	502	1,168	1,670
Sucker "mullet".....	1,929	(1)	1,929	224	(1)	224
Tullibee.....				200		200
Whitefish, common.....	24,345	10,275	34,620	124,549	19,331	143,880
Yellow perch.....	1,414	(1)	1,414	3,743	6,270	10,013
Yellow pike.....	27,657	7,835	35,492	77,912	192,930	270,842
Miscellaneous.....					5,408	5,408
Total.....	105,763	20,250	126,013	254,385	365,415	619,800

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Blue pike.....		1,195	1,195	9,947,464	4,057,195	14,004,659
Bowfin.....				2,948	(1)	2,948
Buffalofish.....				1,910	(1)	1,910
Burbot.....	45	(1)	45	331,116		331,116
Carp.....	6,870	1,691	8,561	4,283,569	619,291	4,902,860
Catfish and bullheads.....	9,412	2,069	11,481	833,364	293,469	1,126,833
Chubs.....				4,056,512	1,631,525	5,688,037
Cisco.....				160,215	851,200	1,011,415
Crappie.....	237	(1)	237	1,018	(1)	1,018
Eels.....				43,536	50,100	93,636
Goldfish.....				48,533	(1)	48,533
Lake herring.....				11,686,374	1,774,900	13,461,274
Lake trout.....	688	25,575	26,263	10,661,712	4,421,075	15,082,787
Mooneye.....				15,684	(1)	15,684
Pike or pickerel (jacks).....	150,564	482,220	632,784	372,556	1,049,373	1,421,929

<sup>1</sup> Where there has been a Canadian catch of these species it is included under Miscellaneous.

*Lake fisheries of the United States and Canada, 1932—Continued*

## CATCH: BY LAKES—Continued

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Rock bass.....				17,500	(1)	17,500
Sauger.....	215,898	(1)	215,898	3,447,579	(1)	3,447,579
Sheepshead.....				2,158,504	(1)	2,158,504
Smelt.....				97,807	(1)	97,807
Steelhead trout.....				5,050	(1)	5,050
Sturgeon.....	882	475	1,357	29,912	53,516	83,428
Sucker "mullet".....	118,718	(1)	118,718	6,192,360	(1)	6,192,360
Sunfish.....				8,084	(1)	8,084
Tullibee.....	1,296,468	14,080	1,310,548	1,296,668	14,080	1,310,748
White bass.....				252,695	(1)	252,695
Whitefish:						
Common.....	17,358	479,248	496,606	9,730,504	3,421,354	13,151,858
Menominee.....				232,674	(1)	232,674
Yellow perch.....	36,473	4,660	41,133	11,472,500	5,177,830	16,650,330
Yellow pike.....	625,761	696,803	1,322,564	4,441,450	1,733,368	6,174,818
Crawfish.....				19,677	(1)	19,677
Mussel shells.....				1,894,914	(1)	1,894,914
Miscellaneous.....		73,670	73,670		1,782,478	1,782,478
Total.....	2,479,374	1,781,686	4,261,060	83,744,389	26,930,754	110,675,143

<sup>1</sup> Where there has been a Canadian catch of these species it is included under Miscellaneous.

*Lake fisheries of the United States, 1932*

## OPERATING UNITS: BY LAKES

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namanagan Lake	Total
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	2	293	246	1,029	135		1,705
On boats and shore:							
Regular.....	78	823	756	834	473	95	3,059
Casual.....	55	363	226	1,064	459	1	2,168
Total.....	135	1,479	1,228	2,927	1,067	96	6,932
Vessels:							
Steam.....		24	16	59	7		106
Net tonnage.....		647	319	1,244	154		2,364
Motor.....	1	33	50	271	37		392
Net tonnage.....	12	314	541	2,892	296		4,055
Total vessels.....	1	57	66	330	44		498
Total net tonnage.....	12	961	860	4,136	450		6,419
Boats:							
Motor.....	51	305	341	569	285	73	1,624
Other.....	59	422	115	580	359		1,535
Apparatus:							
Haul seines.....	5	197	69	53	8		332
Length, yards.....	1,165	89,323	30,004	17,479	1,125		139,096
Gill nets:							
"Bull", 3 to 3½ inches.....		584					584
Square yards.....		233,600					233,600
"Shoal", 2¼ to 3½ inches.....	688	11,945	1,793	16,996	6,687		38,109
Square yards.....	131,791	1,856,075	572,563	1,174,411	2,062,662		8,797,502
"Shoal", 4 to 5¾ inches.....	451	6,685	6,311	42,090	8,411	249	64,197
Square yards.....	78,884	1,412,759	2,260,612	11,563,102	3,124,189	99,102	18,538,648
"Shoal", 6 to 9¾ inches.....	142			414			556
Square yards.....	26,464			54,449			80,913
"Shoal", 10 to 14 inches.....	12	60					72
Square yards.....	6,630	10,170					16,800

*Lake fisheries of the United States, 1932—Continued*

## OPERATING UNITS: BY LAKES—Continued

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Trammel nets.....	222	222		4			226
Square yards.....	9,324			413			9,737
Lines:							
Hand.....		1			5		6
Hooks.....		2			5		7
Troll.....			5	7	29		41
Hooks.....			10	7	29		46
Trot.....	24	45	95	687	2,198		3,049
Hooks.....	7,560	9,990	147,700	380,000	415,210		960,460
Pound nets.....		63	747	814	136	73	1,833
Trap nets.....	152	4,073	2,636	441	124		7,426
Fyke nets.....	131	1,114	398	791	24	116	2,574
Crawfish pots.....				2,910			2,910
Crowfoot bars.....				360			360
Picks.....				126			126

## OPERATING UNITS: BY STATES AND LAKES

Item	New York			Pennsylvania	Ohio
	Lake Ontario	Lake Erie	Total	Lake Erie	Lake Erie
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen:					
On vessels.....	2	83	85	112	96
On boats and shore:					
Regular.....	78	20	98	24	601
Casual.....	55	75	130		249
Total.....	135	178	313	136	946
Vessels:					
Steam.....		5	5	12	7
Net tonnage.....		122	122	298	227
Motor.....	1	11	12	9	12
Net tonnage.....	12	75	87	95	138
Total vessels.....	1	16	17	21	19
Total net tonnage.....	12	197	209	393	365
Boats:					
Motor.....	51	20	71	7	251
Other.....	59	56	115	10	300
Apparatus:					
Haul seines.....	5	13	18		123
Length, yards.....	1,165	1,025	2,190		70,485
Gill nets:					
"Bull", 3 to 3½ inches.....		584	584		
Square yards.....		233,600	233,600		
"Shoal", 2¼ to 3½ inches.....	688	1,321	2,009	4,494	6,001
Square yards.....	131,791	183,122	314,913	741,840	919,050
"Shoal", 4 to 5¾ inches.....	451	2,300	2,751	3,684	563
Square yards.....	78,884	376,804	455,688	933,104	84,450
"Shoal", 6 to 9¾ inches.....	142		142		
Square yards.....	26,464		26,464		
"Shoal", 10 to 14 inches.....	12	60	72		
Square yards.....	6,630	10,170	16,800		
Trammel nets.....					222
Square yards.....					9,324
Lines:					
Trot.....	24	38	62		
Hooks.....	7,560	6,490	14,050		
Pound nets.....				45	18
Trap nets.....	152	21	173	8	3,875
Fyke nets.....	131		131		633

*Lake fisheries of the United States, 1932—Continued*

## OPERATING UNITS: BY STATES AND LAKES—Continued

Item	Michigan					Indiana
	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Total	Lake Michigan
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	2	246	490	86	824	15
On boats and shore:						
Regular.....	178	756	510	260	1,704	10
Casual.....	39	226	497	108	870	49
Total.....	219	1,228	1,497	454	3,398	74
<b>Vessels:</b>						
Steam.....		16	28	7	51	1
Net tonnage.....		319	453	154	926	22
Motor.....	1	50	120	18	189	3
Net tonnage.....	6	541	1,146	125	1,818	41
Total vessels.....	1	66	148	25	240	4
Total net tonnage.....	6	860	1,599	279	2,744	63
<b>Boats:</b>						
Motor.....	27	341	348	163	879	51
Other.....	56	115	364	20	555	33
<b>Apparatus:</b>						
Haul seines.....	61	69	3	8	141	-----
Length, yards.....	17,813	30,004	650	1,125	49,592	-----
Gill nets:						
"Shoal", 2¼ to 3¾ inches.....	129	1,793	5,699	1,815	9,436	361
Square yards.....	12,063	572,563	1,224,695	351,286	2,160,607	105,750
"Shoal", 4 to 5¾ inches.....	138	6,311	27,317	5,687	39,453	440
Square yards.....	18,401	2,260,612	6,911,198	2,173,068	11,363,279	129,167
"Shoal", 6 to 9¾ inches.....	-----	-----	344	-----	344	30
Square yards.....	-----	-----	41,549	-----	41,549	6,300
<b>Lines:</b>						
Hand.....	1	-----	-----	5	6	-----
Hooks.....	2	-----	-----	5	7	-----
Troll.....	-----	5	7	29	41	-----
Hooks.....	-----	10	7	29	46	-----
Trot.....	7	95	142	1,519	1,763	-----
Hooks.....	3,500	147,700	204,350	315,080	670,630	-----
Pound nets.....	-----	747	576	72	1,395	7
Trap nets.....	169	2,636	441	119	3,365	-----
Fyke nets.....	481	398	48	8	935	-----
Crowfoot bars.....	-----	-----	315	-----	315	40
Picks.....	-----	-----	124	-----	124	-----

Item	Illinois	Wisconsin			Minnesota		
	Lake Michigan	Lake Michigan	Lake Superior	Total	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	48	476	49	525	-----	-----	-----
On boats and shore:							
Regular.....	2	312	56	368	157	95	252
Casual.....	10	508	130	638	221	1	222
Total.....	60	1,296	235	1,531	378	96	474
<b>Vessels:</b>							
Steam.....	1	29	-----	29	-----	-----	-----
Net tonnage.....	13	756	-----	756	-----	-----	-----
Motor.....	13	135	19	154	-----	-----	-----
Net tonnage.....	183	1,522	171	1,693	-----	-----	-----
Total vessels.....	14	164	19	183	-----	-----	-----
Total net tonnage.....	196	2,278	171	2,449	-----	-----	-----



*Lake fisheries of the United States, 1932—Continued*

## OPERATING UNITS: BY STATES AND LAKES—Continued

Item	Illinois	Wisconsin			Minnesota		
	Lake Michigan	Lake Michigan	Lake Superior	Total	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	7	163	81	244	41	73	114
Other.....		183	35	218	304		304
Apparatus:							
Haul seines.....		50		50			
Length, yards.....		16,829		16,829			
Gill nets:							
"Shoal", 2¼ to 3¾ inches.....	1,380	9,556	1,258	10,814	3,614		3,614
Square yards.....	288,640	2,555,326	514,973	3,070,299	1,196,403		1,196,403
"Shoal", 4 to 5¾ inches.....	1,122	13,211	1,155	14,366	1,569	249	1,818
Square yards.....	338,668	4,184,069	364,798	4,548,867	586,323	99,102	685,425
"Shoal", 6 to 9¾ inches.....		40		40			
Square yards.....		6,600		6,600			
Trammel nets.....		4		4			
Square yards.....		413		413			
Lines:							
Trot.....	5	540	276	816	403		403
Hooks.....	500	175,150	61,200	236,350	38,940		38,930
Pound nets.....	1	230	64	294		73	73
Trap nets.....			5	5			
Fyke nets.....		743	16	759		116	116
Crawfish pots.....		2,910		2,910			
Crowfoot bars.....		5		5			
Picks.....		2		2			

OPERATING UNITS OF LAKE ONTARIO:<sup>1</sup> BY GEAR

Item	Haul seines	Gill nets				Trot lines	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal", 2¼ to 3¾ inches	"Shoal", 4 to 6 inches	"Shoal", 6 to 10 inches	"Shoal", 10 to 14 inches				
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		2							2
On boats and shore:									
Regular.....	8	41	29	16	2	3	31	17	78
Casual.....	6	17	6	4	4	20	5	2	55
Total.....	14	60	35	20	6	23	36	19	135
Vessels, motor.....	1								1
Net tonnage.....	12								12
Boats:									
Motor.....	1	31	19	9	2	6	15	6	51
Other.....	5	13	8	6	3	17	19	11	59
Apparatus:									
Number.....	5	688	451	142	12	24	152	131	
Length, yards.....	1,165								
Square yards.....		131,791	78,884	26,464	6,630				
Hooks.....						7,560			

<sup>1</sup> Includes Niagara River below the Falls and the St. Lawrence River.

*Lake fisheries of the United States, 1932—Continued*OPERATING UNITS OF LAKE ERIE:<sup>1</sup> BY GEAR

Item	Haul seines	Gill nets				Trammel nets
		"Bull", 3 to 3½ inches	"Shoal", 2¼ to 3¾ inches	"Shoal", 4 to 6 inches	"Shoal", 10 to 14 inches	
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....		56	268	215		
On boats and shore:						
Regular.....	251		36	33	2	14
Casual.....	247		31	10	2	9
Total.....	498	56	335	258	4	23
Vessels:						
Steam.....		2	21	19		
Net tonnage.....		38	563	469		
Motor.....		9	31	22		
Net tonnage.....		64	298	194		
Total vessels.....		11	52	41		
Total net tonnage.....		102	861	663		
Boats:						
Motor.....	68		35	16	3	11
Other.....	173		13	15		2
Apparatus:						
Number.....	197	584	11,945	6,685	60	222
Length, yards.....	89,323					
Square yards.....		233,600	1,856,075	1,412,759	10,170	9,324

  

Item	Lines		Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
	Hand	Trot				
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....						293
On boats and shore:						
Regular.....		8	26	513	121	823
Casual.....	1	44		14	24	363
Total.....	1	52	26	527	145	1,479
Vessels:						
Steam.....						24
Net tonnage.....						647
Motor.....						33
Net tonnage.....						314
Total vessels.....						57
Total net tonnage.....						961
Boats:						
Motor.....		1	8	178	43	305
Other.....	1	44	11	177	45	422
Apparatus:						
Number.....	1	45	63	4,073	1,114	
Hooks.....	2	9,990				

<sup>1</sup> Includes Niagara River above the Falls.

*Lake fisheries of the United States, 1933—Continued*

## OPERATING UNITS OF LAKE HURON: BY GEAR

Item	Haul seines	Gill nets		Lines	
		"Shoal", 2¼ to 3¾ inches	"Shoal", 4 to 6 inches	Troll	Trot
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		69	149		80
On boats and shore:					
Regular.....	110	144	160		62
Casual.....	59	62	67	5	14
Total.....	169	275	376	5	156
<b>Vessels:</b>					
Steam.....		6	12		7
Net tonnage.....		135	235		154
Motor.....		9	25		8
Net tonnage.....		131	305		171
Total vessels.....		15	37		15
Total net tonnage.....		266	540		325
<b>Boats:</b>					
Motor.....	212	76	88	1	31
Other.....	17	30	26	4	5
<b>Apparatus:</b>					
Number.....	69	1,793	6,311	5	95
Length, yards.....	30,004				
Square yards.....		572,563	2,260,612		
Hooks.....				10	147,700

Item	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	27	75		246
On boats and shore:				
Regular.....	258	472	52	756
Casual.....	16	75	17	226
Total.....	301	622	69	1,228
<b>Vessels:</b>				
Steam.....	1	1		16
Net tonnage.....	5	9		319
Motor.....	8	26		50
Net tonnage.....	52	223		541
Total vessels.....	9	27		66
Total net tonnage.....	57	232		860
<b>Boats:</b>				
Motor.....	95	188	21	341
Other.....	25	59	13	115
<b>Apparatus:</b>				
Number.....	747	2,636	398	

*Lake fisheries of the United States, 1932—Continued*OPERATING UNITS OF LAKE MICHIGAN:<sup>1</sup> BY GEAR

Item	Haul seines	Gill nets			Trammel nets	Lines	
		"Shoal", 2¼ to 3¾ inches	"Shoal", 4 to 6 inches	"Shoal", 6 to 10 inches		Troll	Trot
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	12	555	966	5			252
On boats and shore:							
Regular.....	75	264	480	14			38
Casual.....	31	208	363	4	6	7	51
Total.....	118	1,027	1,809	23	6	7	341
<b>Vessels:</b>							
Steam.....		29	50				22
Net tonnage.....		591	987				480
Motor.....	5	154	255	2			51
Net tonnage.....	37	1,782	2,695	13			594
Total vessels.....	5	183	305	2			73
Total net tonnage.....	37	2,373	3,682	13			1,074
<b>Boats:</b>							
Motor.....	8	162	238	8		7	32
Other.....	43	74	74	2	4		29
<b>Apparatus:</b>							
Number.....	53	16,996	42,090	414	4	7	687
Length, yards.....	17,479						
Square yards.....		4,174,411	11,563,102	54,449	413		
Hooks.....						7	380,000

Item	Pound nets	Trap nets	Fyke nets	Craw-fish pots	Crow-foot bars	Picks	By hand	Total, exclusive of duplication
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	92	59	56	2				1,029
On boats and shore:								
Regular.....	425	142	128	7		1		834
Casual.....	16	4	32	16	285	125	142	1,064
Total.....	533	205	216	25	285	126	142	2,927
<b>Vessels:</b>								
Steam.....		2						59
Net tonnage.....		42						1,244
Motor.....	36	15	23	1				271
Net tonnage.....	262	167	172	7				2,892
Total vessels.....	36	17	23	1				330
Total net tonnage.....	262	209	172	7				4,136
<b>Boats:</b>								
Motor.....	171	54	62		135			569
Other.....	129	31	39	23	151	89	49	580
<b>Apparatus:</b>								
Number.....	814	441	791	2,910	360	126		

<sup>1</sup> Includes operating units used in the mussel fisheries of streams tributary to Lakes Michigan, Huron, and Erie. Those used in Lakes Erie and Huron are included herein to avoid disclosure of private enterprise.

## Lake fisheries of the United States, 1932—Continued

## OPERATING UNITS OF LAKE SUPERIOR: BY GEAR

Item	Haul seines	Gill nets		Lines			Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal", 2½ to 3¾ inches	"Shoal", 4 to 6 inches	Hand	Troll	Trot				
Fishermen:	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
On vessels.....		82	99	3		70	26	2	5	135
On boats and shore:										
Regular.....	6	435	443		4	243	52	39	10	473
Casual.....	12	407	414		3	79	10		4	459
Total.....	18	924	956	3	7	392	88	41	19	1,067
Vessels:										
Steam.....		3	7			4				
Net tonnage.....		71	154			86				154
Motor.....		26	23	1		17	9	1	2	37
Net tonnage.....		213	187	7		119	86	9	11	296
Total vessels.....		29	30	1		21	9	1	2	44
Total net tonnage.....		284	341	7		205	86	9	11	450
Boats:										
Motor.....	3	247	254		7	131	26	18	7	285
Other.....	7	348	348			58	3		1	359
Apparatus:										
Number.....	8	6,687	8,411	5	29	2,198	136	124	24	
Length, yards.....	1,125									
Square yards.....		2,062,662	3,124,189							
Hooks.....				5	29	415,210				

OPERATING UNITS OF LAKE OF THE WOODS, RAINY LAKE, AND NAMAKAN LAKE:  
BY GEAR

Item	Gill nets, "shoal", 4 to 6 inches	Pound nets	Fyke nets	Total, exclusive of duplication
Fishermen, on boats and shore:	Number	Number	Number	Number
Regular.....	57	44	38	95
Casual.....	1			1
Total.....	58	44	38	96
Boats: Motor.....	58	18	33	73
Apparatus:				
Number.....	249	73	116	
Square yards.....	99,102			

## CATCH: BY GEAR

Species	New York							
	Haul seines		Gill nets		Trot lines		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....			537,372	\$25,814			1,045	\$73
Burbot.....			16,183	606	102	\$6	5,258	157
Carp.....	58,558	\$2,839	14,753	741			1,084	38
Catfish and bullheads.....	3,046	138	996	86			24,898	1,350
Cisco.....			27,461	2,746				
Eels.....	28	1					8,470	254
Lake herring.....			63,608	4,699			265	21
Lake trout.....			22,871	2,971				
Pike or pickerel (jacks).....	2,376	190	270	25			2,017	161
Rock bass.....			116	6				
Sturgeon.....			3,670	751	21,659	4,556		
Sucker "mullet".....	50,499	2,496	24,934	784			12,344	396
Sunfish.....							2,178	65
White bass.....			2,540	113				
Whitefish, common.....			210,941	37,692			40	6
Yellow perch.....	111	6	73,958	4,745			4,962	248
Yellow pike.....			10,963	1,249				
Total.....	114,618	5,670	1,010,939	\$3,028	21,761	4,562	62,561	2,769

*Lake fisheries of the United States, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	New York—Continued				Pennsylvania			
	Trap nets		Total		Gill nets		Pound nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....	17,635	\$1,249	556,052	\$27,136	1,472,641	\$66,269	101,225	\$4,554
Burbot.....	1,215	13	22,758	782	1,588	16		
Carp.....	3,703	129	78,098	3,747	4,946	247	2,161	59
Catfish and bullheads.....	38,716	1,607	67,656	3,181			2,523	170
Cisco.....			27,464	2,746	81,387	8,138	1,449	145
Eels.....	35,038	1,051	43,536	1,306				
Lake herring.....	8,920	726	72,793	5,446				
Lake trout.....	4,104	482	26,975	3,453	1,046	125	5	1
Mooneye.....							500	5
Pike or pickerel (jacks).....	10,190	826	14,853	1,202				
Rock bass.....	1,092	33	1,208	39				
Sheepshead.....							12,789	297
Sturgeon.....	2,592	518	27,921	5,825			607	101
Sucker "mullet".....	20,690	653	108,467	4,329	5,780	114	6,344	127
Sunfish.....	5,906	191	8,084	256				
White bass.....			2,840	113	1,667	67	7,444	297
Whitefish, common.....	39,139	5,883	250,120	43,581	421,687	6,365	25,701	3,855
Yellow perch.....	23,265	1,557	102,296	6,556	248,259	11,171	77,542	4,291
Yellow pike.....	12,391	1,259	23,354	2,508	278	28	15,875	1,586
Total.....	224,596	16,177	1,434,475	112,206	2,239,279	92,540	254,165	15,488

Species	Pennsylvania—Continued				Ohio			
	Trap nets		Total		Haul seines		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....	33,059	\$1,488	1,606,925	\$72,311	2,541	\$102	319,934	\$12,797
Burbot.....	251	3	1,839	19	470	4	3,780	38
Carp.....	96	3	7,203	309	1,438,863	28,776	7,860	158
Catfish and bullheads.....	300	21	2,823	191	100,469	3,989	1,983	98
Cisco.....			82,836	8,283			48,259	5,791
Goldfish.....					34,708	348		
Lake trout.....			1,051	126				
Mooneye.....			500	5	12,383	123	87	1
Pike or pickerel (jacks).....					1,355	106		
Sauger.....					16,962	678	738,093	29,523
Sheepshead.....	1,070	31	13,859	328	413,885	8,277	6,245	125
Sturgeon.....			607	101				
Sucker "mullet".....	1,700	34	13,824	275	36,564	731	28,773	576
White bass.....	141	5	9,252	369	19,421	777	2,108	83
Whitefish, common.....			447,388	10,220	109	16	66,318	9,947
Yellow perch.....	3,875	232	329,676	15,694	8,952	321	3,115,265	109,057
Yellow pike.....	1,324	132	17,477	1,746	17,907	1,673	25,432	2,525
Total.....	41,816	1,949	2,535,260	109,977	2,104,589	45,921	4,364,137	170,719

Species	Ohio—Continued							
	Trammel nets		Pound nets		Trap nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....					7,457,295	\$298,575	4,717	\$186
Burbot.....					241,738	2,422	108	
Carp.....	194,426	\$3,888	6,525	\$130	87,950	1,758	54,108	1,082
Catfish and bullheads.....	623	31	15,520	465	262,317	11,629	63,890	2,222
Cisco.....	25	3			1,631	196		
Goldfish.....	380	4	2,995	30	3,097	30	2,833	29
Mooneye.....			1,150	11	85	1	1,479	14
Sauger.....			405	16	2,213,507	87,338	119,916	4,796
Sheepshead.....	5,404	108			1,497,334	29,954	146,571	2,931
Sucker "mullet".....	495	10	8,710	174	904,288	18,084	115,962	2,318
White bass.....			1,200	48	175,808	6,738	42,066	1,652
Whitefish, common.....					429,312	64,396	11,345	1,701
Yellow perch.....			460	16	5,950,056	215,004	164,325	5,601
Yellow pike.....			2,835	255	1,616,251	158,644	237,961	21,423
Total.....	201,353	4,044	39,800	1,145	20,840,669	894,769	965,281	43,986

## Lake fisheries of the United States, 1932—Continued

## CATCH: BY GEAR—Continued

Species	Ohio—Continued		Michigan					
	Total		Haul seines		Gill nets		Troll lines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....	7,784,487	\$311,660						
Burbot.....	246,096	2,465	114	\$2	12,668	\$128		
Carp.....	1,789,732	35,792	1,726,381	56,488	1,524	35		
Catfish and bullheads.....	444,802	18,434	32,396	2,535	166	7		
Chubs.....					940,044	67,914		
Cisco.....	49,915	5,990						
Goldfish.....	44,013	441	750	15				
Lake herring.....			23,901	478	636,780	12,354		
Lake trout.....					4,600,878	425,933	36,752	\$3,124
Mooneye.....	15,184	150						
Pike or pickerel (jacks).....	1,355	106	617	50	2,732	205		
Rock bass.....			1,944	94	95	3		
Sauger.....	3,088,883	122,351	1,525	71	30,738	1,366		
Sheepshead.....	2,069,439	41,395	10,250	308				
Smelt.....					22,004	660		
Sucker "mullet".....	1,094,792	21,893	212,910	4,895	264,187	6,500		
White bass.....	240,603	9,328						
Whitefish:								
Common.....	507,084	76,060			2,123,734	226,839		
Menominee.....					127,999	12,591		
Yellow perch.....	9,239,058	329,999	23,256	1,611	214,494	13,736		
Yellow pike.....	1,900,386	184,520	48,006	5,806	194,738	23,418	863	104
Total.....	28,515,829	1,160,584	2,082,050	72,353	9,172,781	791,689	37,615	3,228

Species	Michigan—Continued							
	Trot lines		Pound nets		Trap nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....			158	\$3	2,657	\$53	133	\$3
Burbot.....	3,426	\$45	152	2	1,071	21	2,144	43
Carp.....	1,006	50	29,726	703	155,370	4,564	227,432	10,366
Catfish and bullheads.....	1,761	141	1,426	85	87,337	6,537	135,329	10,713
Chubs.....	427	48	457	22	5,285	527	216	20
Goldfish.....					805	16	2,965	59
Lake herring.....			2,446,350	64,381	302,275	8,110	33,154	776
Lake trout.....	1,502,126	137,901	238,857	22,427	433,180	40,869	1,317	107
Pike or pickerel (jacks).....			4,168	310	39,560	3,199	13,507	1,049
Rock bass.....	145	4	124	4	9,866	334	4,118	166
Sauger.....	10	1	7,795	446	69,720	3,197	33,010	1,624
Sheepshead.....	416	12	12,527	381	20,262	608	31,584	948
Sucker "mullet".....	1,564	35	395,359	9,186	2,671,843	58,158	264,198	6,432
Whitefish:								
Common.....	418	42	2,091,424	214,811	3,557,225	422,550	15,060	1,508
Menominee.....	2,175	196	5,418	522	5,886	575	120	11
Yellow perch.....	12,825	864	35,089	2,385	589,903	39,385	130,757	7,974
Yellow pike.....	223	29	354,448	43,251	1,019,985	123,463	140,845	17,403
Total.....	1,526,522	139,368	5,623,478	358,919	8,972,230	712,166	1,035,889	59,202

Species	Michigan—Continued							
	Crowfoot bars		Picks		By hand		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....							2,948	\$59
Burbot.....							19,575	241
Carp.....							2,141,439	72,206
Catfish and bullheads.....							258,415	20,018
Chubs.....							940,429	68,531
Goldfish.....							4,520	90
Lake herring.....							3,442,460	86,099
Lake trout.....							6,813,110	630,361
Pike or pickerel (jacks).....							60,584	4,813
Rock bass.....							16,292	605
Sauger.....							142,798	6,705
Sheepshead.....							75,039	2,257
Smelt.....							22,004	660
Sucker "mullet".....							3,810,061	85,206
Whitefish:								
Common.....							7,787,861	865,750
Menominee.....							141,598	13,895
Yellow perch.....							1,006,324	65,955
Yellow pike.....							1,759,108	213,474
Mussel shells.....	1,315,500	\$18,180	237,966	\$3,279	125,518	\$1,722	1,678,984	23,181
Pearls and slugs.....		877		283		294		1,454
Total.....	1,315,500	19,057	237,966	3,562	125,518	2,016	30,129,549	2,161,560

*Lake fisheries of the United States, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Indiana									
	Gill nets		Pound nets		Crowfoot bars		By hand		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Buffalofish.....	10	\$1	1,900	\$99	-----	-----	-----	-----	1,910	\$100
Burbot.....	3,887	217	75	3	-----	-----	-----	-----	3,962	220
Carp.....	-----	-----	3,320	119	-----	-----	-----	-----	3,320	119
Chubs.....	184,698	16,473	-----	-----	-----	-----	-----	-----	184,698	16,473
Lake herring.....	94,795	4,146	28,255	930	-----	-----	-----	-----	123,050	5,076
Lake trout.....	98,266	8,289	125	18	-----	-----	-----	-----	98,391	8,307
Steelhead trout.....	4,100	650	-----	-----	-----	-----	-----	-----	4,100	650
Sucker "mullet".....	825	41	1,205	44	-----	-----	-----	-----	2,030	85
Whitefish, common.....	3,000	325	6,210	533	-----	-----	-----	-----	9,210	858
Yellow perch.....	15,928	1,341	7,310	490	-----	-----	-----	-----	23,238	1,831
Yellow pike.....	3,000	450	3,430	343	-----	-----	-----	-----	6,430	793
Mussel shells.....	-----	-----	-----	-----	140,000	\$1,820	30,000	\$390	170,000	2,210
Pearls and slugs.....	-----	-----	-----	-----	-----	140	-----	30	-----	170
Total.....	408,509	31,933	51,830	2,579	140,000	1,960	30,000	420	630,339	36,892

Species	Illinois							
	Gill nets		Trot lines		Pound nets		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....	-----	-----	-----	-----	200	\$4	200	\$4
Chubs.....	466,365	\$28,674	-----	-----	1,080	30	467,445	28,704
Lake herring.....	76,860	3,324	-----	-----	8,720	120	85,580	3,444
Lake trout.....	279,893	21,805	598	\$60	114	12	280,605	21,877
Whitefish, common.....	-----	-----	-----	-----	3,240	360	3,240	360
Yellow perch.....	46,215	3,543	-----	-----	1,500	30	47,715	3,573
Total.....	869,333	57,346	598	60	14,854	556	884,785	57,962

Species	Wisconsin							
	Haul seines		Gill nets		Trammel nets		Trot lines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	60	\$1	26,114	\$392	-----	-----	4,886	\$73
Carp.....	217,871	4,902	7,826	189	3,660	\$82	-----	-----
Catfish and bullheads.....	3,825	268	4,248	297	-----	-----	306	17
Chubs.....	-----	-----	2,404,753	132,568	-----	-----	-----	-----
Lake herring.....	-----	-----	1,343,486	12,141	15	1	614,526	44,348
Lake trout.....	-----	-----	2,038,086	144,574	-----	-----	366	26
Pike or pickerel (jacks).....	17	1	40,383	2,307	-----	-----	-----	-----
Smelt.....	-----	-----	40,643	1,422	-----	-----	-----	-----
Sucker "mullet".....	11,228	281	598,178	14,472	517	13	-----	-----
Whitefish:	-----	-----	-----	-----	-----	-----	-----	-----
Common.....	4,297	481	247,647	26,836	-----	-----	-----	-----
Menominee.....	-----	-----	70,584	2,447	-----	-----	-----	-----
Yellow perch.....	61	4	101,043	6,162	-----	-----	535	33
Yellow pike.....	-----	-----	914	128	-----	-----	-----	-----
Total.....	237,359	5,938	6,923,905	343,935	4,192	96	620,619	44,497

Species	Wisconsin—Continued							
	Pound nets		Trap nets		Fyke nets		Crawfish pots	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	1,965	\$30	211	\$3	3,605	\$54	-----	-----
Carp.....	1,674	38	-----	-----	25,676	578	-----	-----
Catfish and bullheads.....	775	54	-----	-----	41,408	2,909	-----	-----
Chubs.....	12,536	684	12,475	745	-----	-----	-----	-----
Lake herring.....	1,484,164	14,695	312	2	11,079	102	-----	-----
Lake trout.....	255,092	19,173	255	16	1,154	74	-----	-----
Pike or pickerel (jacks).....	21,603	1,541	2,413	141	11,396	774	-----	-----
Sheepshead.....	-----	-----	11	1	156	5	-----	-----
Smelt.....	20,666	723	-----	-----	14,494	508	-----	-----
Steelhead trout.....	950	124	-----	-----	-----	-----	-----	-----
Sucker "mullet".....	178,793	3,019	2,569	23	251,030	6,190	-----	-----
Whitefish:	-----	-----	-----	-----	-----	-----	-----	-----
Common.....	295,547	8,917	734	47	514	33	-----	-----
Menominee.....	18,453	770	-----	-----	71	2	-----	-----
Yellow perch.....	52,303	3,189	-----	-----	528,621	32,245	-----	-----
Yellow pike.....	639	90	-----	-----	1,812	254	-----	-----
Crawfish.....	-----	-----	-----	-----	-----	-----	19,677	\$984
Total.....	2,345,160	53,047	18,980	978	591,016	43,728	19,677	984



*Lake fisheries of the United States, 1932—Continued*

## CATCH: BY GEAR—Continued

Species	Wisconsin—Continued							
	Crowfoot bars		Picks		By hand		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....							36,841	\$553
Carp.....							256,707	5,789
Catfish and bullheads.....							50,256	3,528
Chubs.....							2,430,070	134,014
Lake herring.....							2,839,056	26,941
Lake trout.....							2,909,113	208,185
Pike or pickerel (jacks).....							76,178	4,790
Sheepshead.....							167	6
Smelt.....							75,803	2,653
Steelhead trout.....							950	124
Sucker "mullet".....							1,042,315	23,998
Whitefish:								
Common.....							548,739	36,314
Menominee.....							89,108	3,219
Yellow perch.....							682,563	41,633
Yellow pike.....							3,365	472
Crawfish.....							19,677	984
Mussel shells.....	12,930	\$54	9,000	\$85	24,000	\$100	45,930	239
Total.....	12,930	54	9,000	85	24,000	100	11,106,838	493,442

Species	Minnesota					
	Gill nets		Trot lines		Pound nets	
	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....					6,526	\$125
Chubs.....	25,083	\$495			2,787	55
Crappie.....	51	10				
Lake herring.....	5,123,435	54,251				
Lake trout.....	431,413	32,559	100,366	\$14,642	688	81
Pike or pickerel (jacks).....	166,581	4,104			26,502	654
Sauger.....	107,949	3,082			107,949	3,081
Sturgeon.....					1,384	355
Sucker "mullet".....	48,259	586			48,483	590
Tullibee.....	648,234	8,050			324,217	4,027
Whitefish:						
Common.....	109,879	6,952			51,415	3,329
Menominee.....	1,968	89				
Yellow perch.....	31,784	1,280			374	22
Yellow pike.....	362,902	26,523			308,363	22,888
Total.....	7,057,538	137,981	100,366	14,642	878,688	35,207

Species	Minnesota—Continued			
	Fyke nets		Total	
	Pounds	Value	Pounds	Value
Burbot.....	45	\$1	45	\$1
Carp.....	344	7	6,870	132
Catfish and bullheads.....	9,412	455	9,412	455
Chubs.....			27,870	550
Crappie.....	967	183	1,018	193
Lake herring.....			5,123,435	54,251
Lake trout.....			532,467	47,282
Pike or pickerel (jacks).....	26,503	655	219,586	5,413
Sauger.....			215,898	6,163
Sturgeon.....			1,384	355
Sucker "mullet".....	24,129	294	120,871	1,470
Tullibee.....	324,217	4,027	1,296,668	16,104
Whitefish:				
Common.....	15,568	933	176,862	11,214
Menominee.....			1,968	89
Yellow perch.....	9,472	359	41,630	1,661
Yellow pike.....	60,065	4,409	731,330	53,820
Total.....	470,722	11,323	8,507,314	199,153

## Lake fisheries of the United States, 1932—Continued

## CATCH: BY LAKES

Species	Lake Ontario		Lake Erie					
	New York		New York		Pennsylvania		Ohio	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Blue pike.....	80,785	\$5,080	475,267	\$22,056	1,606,925	\$72,311	7,784,487	\$311,660
Burbot.....	20,343	757	2,415	25	1,839	19	246,096	2,465
Carp.....	54,457	2,531	23,641	1,216	7,203	309	1,789,732	35,792
Catfish and bullheads.....	66,137	3,064	1,519	117	2,823	191	444,802	18,434
Cisco.....			27,464	2,746	82,836	8,253	49,915	5,990
Eels.....	43,536	1,306						
Goldfish.....							44,013	441
Lake herring.....	72,793	5,446						
Lake trout.....	18,285	2,410	8,689	1,043	1,051	126		
Mooneye.....					500	5	15,184	150
Pike or pickerel (jacks).....	14,853	1,202					1,355	106
Rock bass.....	1,092	33	116	6				
Sauger.....							3,088,883	122,351
Sheepshead.....					13,859	328	2,069,439	41,395
Sturgeon.....	11,627	2,556	16,294	3,269	607	101		
Sucker "mullet".....	35,585	1,182	72,882	3,147	13,824	275	1,094,792	21,893
Sunfish.....	8,084	256						
White bass.....			2,840	113	9,252	369	240,603	9,328
Whitefish, common.....	54,635	8,416	195,485	35,165	447,388	10,220	507,084	76,060
Yellow perch.....	27,044	1,648	75,252	4,908	329,676	15,694	9,239,058	329,999
Yellow pike.....	12,022	1,213	11,332	1,295	17,477	1,746	1,900,386	184,520
Total.....	521,279	37,100	913,196	75,106	2,535,260	109,977	28,515,829	1,160,554

Species	Lake Erie—Continued				Lake Huron		Lake Michigan	
	Michigan		Total		Michigan		Michigan	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Blue pike.....			9,866,679	\$400,027				
Bowfin.....	184	\$4	184	4	2,764	\$55		
Burbot.....	1,171	24	251,521	2,533	692	14	15,133	\$132
Carp.....	1,057,554	52,877	2,878,130	90,194	1,055,068	18,464	28,755	863
Catfish and bullheads.....	173,149	13,852	622,293	32,594	80,166	6,012	5,100	154
Chubs.....					507,121	50,717	334,333	8,358
Cisco.....			160,215	17,019				
Goldfish.....	4,520	90	48,533	531				
Lake herring.....					2,646,662	71,460	255,563	3,834
Lake trout.....			9,740	1,169	2,220,624	207,597	2,767,914	276,790
Mooneye.....			15,684	155				
Pike or pickerel (jacks).....	6,248	500	7,603	606	33,194	2,756	15,357	1,152
Rock bass.....	5,774	289	5,890	295	8,455	254	2,063	62
Sauger.....	53,330	2,667	3,142,213	125,018	67,878	2,715	16,015	961
Sheepshead.....	61,025	1,831	2,144,323	43,554	1,925	63	12,089	363
Smelt.....							22,004	660
Sturgeon.....			16,901	3,370				
Sucker "mullet".....	143,755	4,313	1,325,253	29,628	2,592,791	54,457	992,939	24,824
White bass.....			252,695	9,810				
Whitefish:								
Common.....	18,613	1,861	1,168,570	123,306	4,332,874	487,802	3,053,548	335,890
Menominee.....					30,006	2,880	97,236	9,723
Yellow perch.....	89,215	4,461	9,733,201	355,062	700,094	48,306	200,351	12,023
Yellow pike.....	90,862	10,903	2,020,057	198,464	1,568,044	189,543	95,312	12,391
Mussels shells <sup>3</sup> .....							1,678,984	23,181
Pearls and slugs <sup>3</sup> .....								1,454
Total.....	1,705,400	93,672	33,669,685	1,439,339	15,848,358	1,143,095	9,592,726	712,835

<sup>3</sup> From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

*Lake fisheries of the United States, 1932—Continued*

## CATCH: BY LAKES—Continued

Species	Lake Michigan—Continued							
	Indiana		Illinois		Wisconsin		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Buffalofish.....	1,910	\$100					1,910	\$100
Burbot.....	3,962	220			36,059	\$541	55,154	913
Carp.....	3,320	119	200	\$4	251,620	5,662	283,895	6,648
Catfish and bullheads.....					50,256	3,528	55,356	3,682
Chubs.....	184,698	16,473	467,445	28,704	2,142,632	117,835	3,129,108	171,370
Lake herring.....	123,050	5,076	85,580	3,444	2,476,891	24,770	2,941,084	37,124
Lake trout.....	98,391	8,307	280,605	21,877	2,344,870	172,074	5,491,780	479,048
Pike or pickerel (jacks).....					18,030	1,261	33,387	2,413
Rock bass.....							2,063	62
Sauger.....							16,015	961
Sheepshead.....					156	5	12,245	368
Smelt.....					75,803	2,653	97,807	3,313
Steelhead trout.....	4,100	650			950	124	5,050	774
Sucker "mullet".....	2,030	85			914,433	22,861	1,909,402	47,770
Whitefish:								
Common.....	9,210	858	3,240	360	491,606	32,658	3,557,604	369,766
Menominee.....					29,951	1,326	127,187	11,049
Yellow perch.....	23,238	1,831	47,715	3,573	682,275	41,620	953,609	59,047
Yellow pike.....	6,430	793			3,365	472	105,107	13,656
Crawfish.....					19,677	984	19,677	984
Mussel shells <sup>3</sup> .....	170,000	2,210			45,930	239	1,894,914	25,630
Pearls and slugs <sup>3</sup> .....		170						1,624
Total.....	630,339	36,892	884,785	57,962	9,584,504	428,613	20,692,354	1,236,302

Species	Lake Superior					
	Michigan		Wisconsin		Minnesota	
	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	2,579	\$51	782	\$12		
Carp.....	62	2	5,087	127		
Chubs.....	104,975	9,456	287,438	16,179		
Lake herring.....	540,235	10,805	362,165	2,171	5,123,435	\$54,251
Lake trout.....	1,824,572	145,974	564,243	36,111	531,779	47,201
Pike or pickerel (jacks).....	5,785	405	58,148	3,529		
Sauger.....	5,575	362				
Sheepshead.....			11	1		
Sucker "mullet".....	80,576	1,612	127,882	1,137		
Whitefish:						
Common.....	382,826	40,197	57,133	3,656	10,610	936
Menominee.....	14,356	1,292	59,157	1,893	1,968	89
Yellow perch.....	16,634	1,165	288	13		
Yellow pike.....	4,890	637				
Total.....	2,983,065	211,958	1,522,334	64,829	5,667,792	102,477

<sup>3</sup> From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

*Lake fisheries of the United States, 1932—Continued*

## CATCH: BY LAKES—Continued

Species	Lake Superior—Con.		Lake of the Woods, Rainy Lake, and Namakan Lake		Total, all lakes	
	Total		Minnesota			
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....					9,947,464	\$411,107
Bowfin.....					2,948	59
Buffalofish.....					1,910	100
Burbot.....	3,361	\$63	45	\$1	331,116	4,281
Carp.....	5,149	129	6,870	132	4,283,569	118,098
Catfish and bullheads.....			9,412	455	833,364	45,807
Chubs.....	392,413	25,635	27,870	550	4,056,512	248,272
Cisco.....					160,215	17,019
Crappie.....			1,018	193	1,018	193
Eels.....					43,536	1,306
Goldfish.....					48,533	531
Lake herring.....	6,025,835	67,227			11,686,374	181,257
Lake trout.....	2,920,594	229,286	688	81	10,661,712	919,591
Mooneye.....					15,684	155
Pike or pickerel (jacks).....	63,933	3,934	219,586	5,413	372,556	16,324
Rock bass.....					17,500	644
Sauger.....	5,575	362	215,898	6,163	3,447,579	135,219
Sheepshead.....	11	1			2,158,504	43,986
Smelt.....					97,807	3,313
Steelhead trout.....					5,050	774
Sturgeon.....			1,384	355	29,912	6,281
Sucker "mullet".....	208,458	2,740	120,871	1,470	6,192,360	137,256
Sunfish.....					8,084	256
Tullibees.....			1,296,668	16,104	1,296,668	16,104
White bass.....					252,695	9,810
Whitefish:						
Common.....	450,569	44,789	166,252	10,278	9,730,504	1,044,357
Menominee.....	75,481	3,274			232,674	17,203
Yellow perch.....	16,922	1,178	41,630	1,661	11,472,500	466,902
Yellow pike.....	4,890	637	731,330	53,820	4,441,450	457,333
Crawfish.....					19,677	984
Mussel shells <sup>2</sup> .....					1,894,914	25,630
Pearls and slugs <sup>3</sup> .....						1,624
Total.....	10,173,191	379,264	2,839,522	96,676	83,744,389	4,331,776

<sup>3</sup> From streams tributary to Lakes Michigan, Huron, and Erie. The mussel shells taken in streams tributary to Lakes Huron and Erie, which were inconsiderable, have been included with those taken in Lake Michigan, State of Michigan, to avoid disclosure of private enterprise.

**FISHERIES OF THE MISSISSIPPI RIVER AND TRIBUTARIES**

The most recent complete catch statistics of the fisheries of the Mississippi River and tributaries are those collected for the year 1931, a summary of which follows:

The yield of fishery products in that year amounted to 82,382,523 pounds, valued at \$2,897,357, which was a decrease of 22 percent in the catch and 36 percent in its value as compared with the catch and its value in 1922 when the most recent preceding survey was made. Detailed statistics of the fisheries of the Mississippi River and tributaries appear in "Fishery Industries of the United States, 1932" by R. H. Fiedler, Appendix III to Report of Commissioner of Fisheries for the fiscal year 1933.

Following the summary of the fisheries of the Mississippi River and tributaries for 1931 are statistics of the fisheries of Lakes Pepin and Keokuk and the Mississippi River between these two lakes for 1932.

*Catch of the fisheries of the Mississippi River and tributaries, 1931*

Species	Pounds	Value	Species	Pounds	Value
FISH			SHELLFISH, ETC.		
Black bass.....	14,000	\$1,680	Crawfish.....	29,248	\$292
Bowfin.....	428,316	9,299	Shrimp.....	48,503	3,923
Buffalofish.....	15,772,451	687,288	Mussel shells.....	37,254,697	421,611
Carp.....	11,891,761	455,399	Pearls.....	-----	11,436
Catfish and bullheads.....	10,266,847	877,798	Slugs.....	-----	68,216
Crappie.....	41,141	2,959	Frogs.....	874,901	130,882
Eels.....	6,978	441	Terrapin.....	19,170	391
Garfish.....	72,450	791	Turtles:	-----	-----
Minnows.....	525	209	Snapper.....	75,190	3,008
Mooneye.....	3,090	153	Soft-shell.....	19,100	394
Paddlefish or spoonbill cat.....	951,452	43,134	Total.....	38,320,809	640,153
Pike or pickerel.....	4,700	470	Grand total.....	82,382,523	2,897,357
Quillback or "American carp".....	268,438	11,286			
Sauger.....	2,365	451			
Sheepshead.....	3,904,844	142,938			
Sturgeon, shovelnose.....	87,426	8,163			
Sucker "mullet".....	314,835	12,682			
Sunfish.....	21,850	1,094			
Whitebass.....	3,300	198			
Yellow pike.....	4,945	771			
Total.....	44,061,714	2,257,204			

## LAKE PEPIN

*Fisheries of Lake Pepin, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets	Pound nets	Fyke nets	Spears	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	2	-----	5	10	-----	13
Casual.....	40	10	5	20	7	42
Total.....	42	10	10	30	7	55
Boats:						
Motor.....	16	8	8	18	4	24
Other.....	16	-----	-----	11	3	20
Apparatus:						
Number.....	39	8	30	277	7	-----
Length, yards.....	7,501	-----	-----	-----	-----	-----
Square yards.....	-----	533	-----	-----	-----	-----

## CATCH: BY GEAR

Species	Haul seines		Gill nets		Pound nets		Fyke nets		Spears		Total	
	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>	<i>Lb.</i>	<i>Value</i>
Bowfin.....	2,600	\$78	-----	-----	-----	-----	350	\$10	-----	-----	2,950	\$88
Buffalofish.....	5,350	214	3,000	\$120	8,000	\$320	6,900	276	300	\$12	23,550	942
Carp.....	293,300	8,799	10,000	300	26,000	780	117,300	3,519	5,300	159	451,900	13,557
Catfish and bullheads.....	3,800	373	-----	-----	13,000	1,300	11,500	1,132	-----	-----	28,300	2,805
Sheepshead.....	10,600	394	2,000	80	10,000	400	4,400	176	700	28	27,700	1,078
Sucker "mullet".....	80,000	1,600	1,000	20	10,000	200	2,750	55	-----	-----	93,750	1,875
Turtles.....	2,350	47	-----	-----	-----	-----	-----	-----	-----	-----	2,350	47
Total.....	398,000	11,505	16,000	520	67,000	3,000	143,200	5,168	6,300	199	630,500	20,392

*Fisheries of Lake Pepin, 1932—Continued*

## OPERATING UNITS: BY STATES

Item	Minnesota	Wisconsin	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....		13	13
Casual.....	6	36	42
Total.....	6	49	55
<b>Boats:</b>			
Motor.....	2	22	24
Other.....	2	18	20
<b>Apparatus:</b>			
Haul seines.....	2	37	39
Length, yards.....	500	7,001	7,501
Gill nets.....		8	8
Square yards.....		533	533
Pound nets.....		30	30
Fyke nets.....		277	277
Spears.....	1	6	7

## CATCH: BY STATES

Species	Minnesota		Wisconsin		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin.....			2,950	\$88	2,950	\$88
Buffalofish.....	200	\$8	23,350	934	23,550	942
Carp.....	23,300	699	428,600	12,858	451,900	13,557
Catfish and bullheads.....	500	50	27,800	2,755	28,300	2,805
Sheepshead.....	1,700	38	26,000	1,040	27,700	1,078
Sucker "mullet".....	2,000	40	91,750	1,835	93,750	1,875
Turtles.....			2,350	47	2,350	47
Total.....	27,700	835	602,800	19,557	630,500	20,392

## LAKE KEOKUK

*Fisheries of Lake Keokuk, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Lines	Fyke nets	Total, exclusive of duplication
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	9		21	21
Casual.....	27	10	49	53
Total.....	36	10	70	74
<b>Boats:</b>				
Motor.....	15	4	29	32
Other.....	15	8	33	39
<b>Apparatus:</b>				
Number.....	16	22	522	
Length, yards.....	4,666			
Hooks.....		4,600		

## CATCH: BY GEAR

Species	Haul seines		Lines		Fyke nets		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin.....	3,125	\$69					3,125	\$69
Buffalofish.....	12,500	500			70,000	\$2,800	82,500	3,300
Carp.....	125,000	3,750	1,500	\$45	83,250	2,527	209,750	6,322
Catfish and bullheads.....	4,500	450	2,200	220	80,850	8,085	87,550	8,755
Paddlefish or spoonbill cat.....	1,300	130					1,300	130
Pike or pickerel.....	300	15					300	15
Sheepshead.....	38,000	1,080	1,250	50	52,500	1,432	91,750	2,562
Sturgeon, shovelnose.....	1,100	92					1,100	92
Sucker "mullet".....	7,000	140			3,125	62	10,125	202
Turtles.....	1,000	20			800	16	1,800	36
Total.....	193,825	6,246	4,950	315	290,525	14,922	489,300	21,483

*Fisheries of Lake Keokuk, 1932—Continued*

## OPERATING UNITS: BY STATES

Items	Illinois	Iowa	Total
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	6	15	21
Casual.....	20	33	53
<b>Total.....</b>	<b>26</b>	<b>48</b>	<b>74</b>
<b>Boats:</b>			
Motor.....	11	21	32
Other.....	13	26	39
<b>Apparatus:</b>			
Haul seines.....	5	11	16
Length, yards.....	833	3, 833	4, 666
Lines.....	22		22
Hooks.....	4, 600		4, 600
Fyke nets.....	227	295	522

## CATCH: BY STATES

Species	Illinois		Iowa		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin.....			3, 125	\$69	3, 125	\$69
Buffalofish.....	13, 000	\$520	69, 500	2, 780	82, 500	3, 300
Carp.....	68, 000	2, 040	141, 750	4, 282	209, 750	6, 322
Catfish and bullheads.....	39, 800	3, 980	47, 750	4, 775	87, 550	8, 755
Paddlefish or spoonbill cat.....			1, 300	130	1, 300	130
Pike or pickerel.....			300	15	300	15
Sheepshead.....	19, 500	800	72, 250	1, 762	91, 750	2, 562
Sturgeon, shovelnose.....			1, 100	92	1, 100	92
Sucker "mullet".....	1, 500	30	8, 625	172	10, 125	202
Turtles.....	800	16	1, 000	20	1, 800	36
<b>Total.....</b>	<b>142, 600</b>	<b>7, 386</b>	<b>346, 700</b>	<b>14, 097</b>	<b>489, 300</b>	<b>21, 483</b>

## MISSISSIPPI RIVER BETWEEN LAKE PEPIN AND LAKE KEOKUK

*Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932*

## OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets	Lines	Dip nets	Fyke nets	Pound nets	Total, exclusive of duplication
<b>Fishermen:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	99		1		214	6	229
Casual.....	328	2	164	40	450	6	563
<b>Total.....</b>	<b>427</b>	<b>2</b>	<b>165</b>	<b>40</b>	<b>664</b>	<b>12</b>	<b>792</b>
<b>Boats:</b>							
Motor.....	151	1	65		312	6	336
Other.....	153	1	103	10	309	6	396
<b>Apparatus:</b>							
Number.....	209	1	167	40	6, 973	31	
Length, yards.....	43, 667						
Square yards.....		250					
Hooks.....			19, 275				

*Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932—*  
Continued

## CATCH: BY GEAR

Species	Haul seines		Gill nets		Lines		Dip nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....	166,900	\$4,974						
Buffalofish.....	329,300	13,176	3,000	\$120			15,500	\$620
Carp.....	1,316,200	39,126	1,000	30	30,200	\$906	17,000	510
Catfish and bullheads.....	33,400	3,340	500	50	32,700	3,090	500	50
Gizzard shad.....	1,800	36						
Mooneye.....	3,500	90						
Paddlefish or spoonbill cat.....	3,600	390					1,700	170
Pike or pickerel.....	11,600	1,120						
Sheepshead.....	376,900	15,085	3,000	120	17,250	679	24,000	960
Sturgeon, shovelnose.....	20,750	2,075			4,400	440	7,200	720
Sucker "mullet".....	140,600	2,812	700	14			5,000	100
Turtles:								
Snapper.....	12,350	271						
Soft-shell.....	2,600	52						
Total.....	2,419,500	82,547	8,200	334	84,550	5,115	70,900	3,130

Species	Fyke nets		Pound nets		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....	500	\$10	7,000	\$210	174,400	\$5,194
Buffalofish.....	784,450	31,269	17,500	700	1,149,750	45,885
Carp.....	942,500	28,255	66,000	1,980	2,372,900	70,807
Catfish and bullheads.....	577,950	57,555	1,700	170	646,750	64,255
Eels.....	1,000	80			1,000	80
Gizzard shad.....					1,800	36
Mooneye.....					3,500	90
Paddlefish or spoonbill cat.....					5,300	560
Pike or pickerel.....			500	50	12,100	1,170
Sheepshead.....	298,800	11,702	11,000	440	730,950	28,986
Sturgeon, shovelnose.....	8,025	802	750	75	41,125	4,112
Sucker "mullet".....	46,400	928	7,000	140	199,700	3,994
Turtles:						
Snapper.....	700	14			13,050	285
Soft-shell.....					2,600	52
Total.....	2,660,325	130,615	111,450	3,765	5,354,925	225,506

## OPERATING UNITS: BY STATES

Item	Illinois	Iowa	Minnesota	Wisconsin	Total
Fishermen:	Number	Number	Number	Number	Number
Regular.....	39	113	12	65	229
Casual.....	159	215	53	136	563
Total.....	198	328	65	201	792
Boats:					
Motor.....	74	144	31	87	336
Other.....	108	153	43	92	396
Apparatus:					
Haul seines.....	42	83	21	63	209
Length, yards.....	6,998	18,168	4,667	13,834	43,667
Square yards.....				1	1
Lines.....	49	57	34	27	167
Hooks.....	6,400	8,900	3,400	575	19,275
Dip nets.....		40			40
Fyke nets.....	1,470	3,178	485	1,840	6,973
Pound nets.....		31			31



*Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1932—*  
Continued

## CATCH: BY STATES

Species	Illinois		Iowa		Minnesota	
	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....	700	\$14	78,450	\$2,328	4,250	\$127
Buffalofish.....	183,100	7,324	519,300	20,747	52,700	2,108
Carp.....	456,500	13,695	913,700	27,391	216,800	6,144
Catfish and bullheads.....	198,700	14,870	339,300	33,750	38,100	3,570
Eels.....			1,000	80		
Gizzard shad.....						
Mooneye.....			3,500	90		
Paddlefish or spoonbill cat.....	500	50	4,300	460		
Pike or pickerel.....			12,100	1,170		
Sheepshead.....	139,500	5,580	247,200	9,636	67,050	2,682
Sturgeon, shovelnose.....	2,400	240	36,225	3,622	1,100	110
Sucker "mullet".....	7,000	140	51,700	1,034	47,600	952
Turtles:						
Snapper.....	500	10	7,400	172	1,300	26
Soft-shell.....			350	7		
Total.....	938,900	41,923	2,214,525	100,487	428,900	15,719

Species	Wisconsin		Total	
	Pounds	Value	Pounds	Value
Bowfin.....	91,000	\$2,725	174,400	\$5,194
Buffalofish.....	394,650	15,706	1,149,750	45,885
Carp.....	785,900	23,577	2,372,900	70,807
Catfish and bullheads.....	120,650	12,065	646,750	64,255
Eels.....			1,000	80
Gizzard shad.....	1,800	36	1,800	36
Mooneye.....			3,500	90
Paddlefish or spoonbill cat.....	500	50	5,300	560
Pike or pickerel.....			12,100	1,170
Sheepshead.....	277,200	11,088	730,950	23,986
Sturgeon, shovelnose.....	1,400	140	41,125	4,112
Sucker "mullet".....	93,400	1,868	199,700	3,994
Turtles:				
Snapper.....	3,850	77	13,050	285
Soft-shell.....	2,250	45	2,600	52
Total.....	1,772,600	67,377	5,354,925	225,506

FISHERIES OF ALASKA<sup>12</sup>

The catch of fishery products in Alaska during 1932 amounted to 598,855,651 pounds, valued at \$6,971,324 which is an increase of less than one-half of one percent in volume but a decrease of 31 percent in value as compared with the previous year. Of the total catch in 1932, 452,536,052 pounds, valued at \$5,765,501, consisted of salmon; 143,406,896 pounds, valued at \$1,048,045, other fish; and 2,912,703 pounds, valued at \$157,778, shellfish. In addition 270 whales were taken. These fisheries gave employment to 8,059 fishermen, 1,261 persons on transporting vessels, and 10,802 persons in the wholesale and manufacturing industries—a total of 20,122 persons which is a decrease of 11 percent as compared with the number employed during 1931.

<sup>12</sup> Statistics for the fisheries of Alaska are collected and compiled by the Alaska Division of this Bureau. A summary of these statistics appears in this section. For detailed figures the reader is referred to "Alaska Fisheries and Fur-Seal Industries in 1932" by Ward T. Bower, App. I to the Report of Commissioner of Fisheries for the fiscal year 1933.

*Fisheries of Alaska, 1932*

SUMMARY: BY DISTRICTS

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
<b>PERSONS ENGAGED</b>								
In fishing.....	3,097	-----	2,210	-----	2,752	-----	8,059	-----
In transporting.....	408	-----	478	-----	3,375	-----	1,261	-----
In wholesale and manufacturing industries.....	4,010	-----	3,037	-----	3,755	-----	10,802	-----
Total.....	7,515	-----	5,725	-----	6,882	-----	20,122	-----
<b>CRAFT EMPLOYED</b>								
Vessels fishing.....	390	-----	48	-----	8	-----	446	-----
Boats fishing.....	1,558	-----	1,267	-----	1,313	-----	4,138	-----
Vessels transporting.....	98	-----	120	-----	77	-----	293	-----
Scows, houseboats, pile drivers, etc.....	206	-----	232	-----	161	-----	599	-----
Total.....	2,252	-----	1,667	-----	1,559	-----	5,478	-----
<b>CATCH</b>								
Fish:	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Salmon.....	174,728,919	\$2,041,040	132,933,478	\$1,728,252	144,813,655	\$1,996,209	452,356,052	\$5,765,501
Other.....	106,180,540	884,196	54,470,645	174,984	3,755,911	18,865	143,406,886	1,048,045
Shellfish.....	774,155	38,894	2,158,568	118,884	-----	-----	2,912,703	157,778
Total.....	280,683,394	2,934,130	169,602,691	2,022,120	148,569,566	2,015,074	598,855,651	6,971,324
Whales.....	Number	-----	Number	-----	Number	-----	Number	-----
Establishments.....	77	-----	80	-----	44	-----	270	-----
<b>WHOLESALE AND MANUFACTURING</b>								
<b>PRODUCTS AS PREPARED FOR MARKET</b>								
Salmon.....	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Herring.....	118,282,518	8,004,080	78,606,428	6,777,459	70,987,135	7,828,272	267,876,081	22,609,811
Halibut.....	38,906,732	563,600	16,615,555	499,297	2,338,620	110,261	57,860,907	1,173,158
Cod.....	13,530,363	491,547	21,933	1,505	-----	-----	13,552,296	1,493,052
Trout.....	-----	114,213	3,552	2,031	83,050	-----	197,263	5,583
Sablefish.....	2,664	178	9,682	764	-----	-----	12,346	942
Smelt.....	86,719	2,378	5,100	357	-----	-----	86,719	2,378
Rockfish.....	2,762	48	-----	-----	-----	-----	5,100	357
Clam.....	240	130	878,388	447,238	-----	-----	2,762	48
Shrimp.....	299,886	113,851	2,200	285	-----	-----	878,628	447,368
Crab.....	124,198	32,197	194,721	58,757	-----	-----	301,786	114,136
Whale.....	-----	-----	7,664,143	91,133	-----	-----	318,919	90,954
Total.....	171,235,782	9,208,009	104,112,363	7,880,347	73,408,805	7,940,564	348,766,950	25,028,920

## OPERATING UNITS: BY DISTRICTS

Item	South-east Alaska	Central Alaska	Western Alaska	Total	Item	South-east Alaska	Central Alaska	Western Alaska	Total
Fishermen	Number	Number	Number	Number	Apparatus—continued	Number	Number	Number	Number
Vessels fishing	3, 057	2, 210	2, 752	8, 059	Gill nets	158	1, 499	1, 994	3, 651
Stem	---	4	---	4	Yards	24, 250	126, 210	250, 492	400, 952
Motor	390	276	442	276	Beam trawls	11	---	---	12
Net tonnage	5, 129	44	8	6, 088	Wheels	---	---	283	283
Boats fishing	---	765	194	6, 088	Lines:	---	---	---	---
Motor	702	336	45	1, 083	Hand lines (cod fishery)	---	27	22	49
Other	856	931	1, 268	3, 055	Trawl lines (cod fishery)	3, 047	5	1	6
Apparatus:	---	---	---	---	Troll lines (salmon fishery)	2, 318	---	---	3, 017
Traps	193	149	1	343	Skates of lines (halibut fishery)	---	---	---	2, 318
Purse seines	223	66	3	95, 558	Crab pots	---	400	---	900
Yards	78, 974	15, 234	1, 350	95, 558	Herring pounds	3	---	---	50
Haul seines	4	85	1	21, 990	Pound seines	15	11	---	20
Yards	800	20, 990	200	21, 990	---	---	---	---	26

## CATCH: BY DISTRICTS

[Estimated round weight and value to fishermen]

Item	South-east Alaska	Central Alaska	Western Alaska	Total
<b>FISH</b>				
Salmon:	Pounds	Value	Pounds	Value
Blueback, red or sockeye	11, 564, 455	\$203, 113	119, 123, 123	\$3, 013, 930
Chinook or king	11, 283, 210	181, 218	2, 551, 800	253, 609
Chum or keta	50, 343, 606	413, 380	13, 592, 286	610, 616
Humpback or pink	90, 422, 400	1, 114, 073	53, 658, 244	1, 695, 088
Silver or coho	11, 115, 248	129, 256	62, 514	192, 558
Herring	90, 011, 137	360, 045	34, 076, 470	517, 880
Halibut	15, 033, 737	491, 547	24, 370	493, 052
Cod	---	---	350, 053	3, 388
Trout:				
Dolly Varden	1, 027	54	12, 102	818
Seahead	2, 662	124	---	2, 662
Sablefish	127, 528	2, 378	---	2, 378
Snail	---	---	357	357
Rockfishes	4, 249	48	---	48
Total	279, 909, 259	2, 895, 236	148, 569, 566	6, 813, 546



## PRODUCTS AS PREPARED FOR MARKET

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>FRESH</b>								
Salmon (for food).....	1,095,913	\$70,574	7,600	\$38	---	---	1,095,913	\$70,574
Salmon (for bait).....	108,900	330	---	---	---	---	116,500	368
Herring (for bait).....	2,806,210	25,430	993,000	7,956	---	---	3,799,210	33,446
Halibut.....	11,478,568	427,181	13,933	945	---	---	11,492,501	428,126
Trout.....	---	---	4,582	458	---	---	4,582	458
Sablefish.....	43,705	1,281	---	---	---	---	43,705	1,281
Smelt.....	---	---	5,100	357	---	---	5,100	357
Rockfishes.....	762	18	---	---	---	---	762	18
Crabs.....	---	---	---	---	---	---	---	---
Meat.....	37,968	10,450	28,485	6,294	---	---	66,453	16,744
Whole in shell.....	18,550	579	10,380	510	---	---	28,930	1,098
Clams, whole in shell.....	---	---	240	50	---	---	240	50
Shrimp.....	---	---	---	---	---	---	---	---
Meat.....	298,436	113,678	1,000	225	---	---	299,436	113,903
Whole in shell.....	1,130	173	1,200	60	---	---	2,330	233
Total.....	15,890,162	649,754	1,065,520	16,902	---	---	16,955,682	666,656
<b>FROZEN</b>								
Salmon (for food).....	6,116,921	226,204	---	---	---	---	6,116,921	226,204
Salmon (for bait).....	50,000	200	---	---	---	---	50,000	200
Herring (for bait).....	2,687,605	14,496	---	---	---	---	2,687,605	14,496
Halibut.....	2,051,795	64,366	8,000	500	---	---	2,059,795	64,926
Trout.....	1,416	61	5,100	306	---	---	6,516	367
Sablefish.....	12,240	192	---	---	---	---	12,240	192
Rockfishes.....	2,000	30	---	---	---	---	2,000	30
Total.....	10,921,977	305,549	13,100	866	---	---	10,935,077	306,415
<b>CURED</b>								
Salmon.....	---	---	---	---	---	---	---	---
Mid-cured.....	4,241,600	446,035	17,600	660	175,200	\$14,809	4,434,400	461,504
Pickled.....	16,200	940	117,275	7,909	171,985	305,410	20,629	96,343
Dried and smoked.....	---	---	770	85	2,390,770	96,258	2,391,540	96,343
Herring.....	---	---	---	---	---	---	---	---
Pickled (for food) Scotch cure.....	2,680,825	127,608	8,342,150	400,532	1,770,250	90,650	12,793,225	618,880
Roused.....	---	---	---	---	422,900	14,520	422,900	14,520
Spiced.....	1,200	200	---	---	---	---	1,200	200
Dry-salted.....	---	---	---	---	145,470	5,091	145,470	5,091
Cod.....	---	---	---	---	---	---	---	---
Dry-salted.....	---	---	74,345	1,746	72,000	1,725	146,345	3,471
Stockfish.....	---	---	17,100	1,087	2,500	56	19,600	1,143
Pickled.....	---	---	22,468	674	8,550	250	31,018	924
Tongues.....	---	---	300	45	---	---	300	45
Sablefish, pickled.....	30,774	905	---	---	---	---	30,774	905
Total.....	6,970,599	575,778	8,592,008	412,738	5,158,805	235,139	20,721,412	1,223,655

*Industries related to the fisheries of Alaska, 1932—Continued*  
PRODUCTS AS PREPARED FOR MARKET—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
<b>CANNED</b>								
Salmon:								
Blueback, red or sockeye.....	6,669,216	\$795,250	31,687,728	\$3,670,428	62,590,944	\$7,334,191	100,947,888	\$11,799,869
Chinook or king.....	1,133,952	113,907	1,550,496	196,736	652,800	68,665	3,337,248	379,308
Chum or keta.....	27,813,261	1,612,295	7,075,680	408,523	4,497,744	267,629	39,386,688	2,288,447
Humpback or pink.....	66,192,288	4,363,653	34,754,448	2,240,681	484,224	32,628	101,430,960	6,636,962
Silver or coho.....	4,177,824	365,144	2,912,352	244,189	22,224	1,882	7,112,400	611,215
Trout.....	1,248	117					1,248	117
Miscellaneous fish.....	1,440	288	1,536	640	2,064	430	5,040	1,358
Clams.....	240	130	878,148	447,188			878,388	447,318
Crabs.....	67,680	21,168	155,856	51,944			223,536	73,112
Total.....	106,057,152	7,271,952	79,016,244	7,260,329	68,250,000	7,705,425	253,323,396	22,237,706
<b>BYPRODUCTS</b>								
Fertilizer:								
Salmon.....	500,000	7,500	347,285	3,560			847,285	11,060
Whale.....			2,090,000	13,870			2,090,000	13,870
Meal, herring.....	15,298,179	183,898	3,920,300	46,008			19,218,479	223,906
Oil:								
Salmon.....	165,000	1,760	133,658	4,010			298,658	5,770
Herring.....	15,432,713	211,818	3,360,105	44,801			18,792,818	256,619
Whale.....			5,520,083	76,379			5,520,083	76,379
Sperm.....			54,060	884			54,060	884
Total.....	31,395,892	404,976	15,425,491	189,512			46,821,383	594,488
Grand total.....	171,235,782	9,208,009	104,112,363	7,880,347	73,408,805	7,940,564	348,766,950	25,028,920

NOTE.—Halibut products include all taken by the Alaska fleet, some of which were landed at other than Alaska ports. The total landings in Alaska in 1932 amounted to 4,562,983 pounds, valued at \$134,652, as compared with 9,626,118 pounds, valued at \$608,480, in 1931.

Supplementary table showing the pack of canned products in "standard cases" <sup>1</sup>

Item	Southeast Alaska		Central Alaska		Western Alaska		Total
	Cases	Value	Cases	Value	Cases	Value	
Salmon:							
Blueback, red or sockeye.....	138,942	\$795,950	660,161	\$3,670,428	1,303,978	\$7,334,191	\$11,799,869
Chinook or king.....	23,624	113,907	32,302	196,736	13,600	69,526	19,379,308
Chum or keta.....	579,443	1,612,295	147,410	408,523	83,703	267,629	2,282,447
Humpback or pink.....	1,379,068	4,363,653	724,051	2,240,681	10,088	32,628	6,636,962
Silver or coho.....	87,068	366,144	60,674	244,189	463	1,882	611,115
Trout.....	26	117	32	640	-----	-----	1,353
Miscellaneous fish.....	30	288	58,943	447,188	43	105	447,318
Clams.....	16	130	3,247	51,944	-----	-----	73,112
Crabs.....	1,410	21,168	-----	-----	-----	-----	-----
Total.....	2,209,535	7,271,952	1,686,420	7,260,329	1,421,875	7,705,425	22,237,706

<sup>1</sup> The pack of salmon, trout, miscellaneous fish, and crabs has been converted to "standard cases" of 48 1-pound cans, and clams to "standard cases" of 48 No. 1 5-ounce cans.

Supplementary table showing the output of byproducts in tons and gallons

Item	Southeast Alaska		Central Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Fertilizer:						
Salmon.....	250	\$7,500	174	\$3,560	424	\$11,060
Whale.....	-----	-----	1,045	13,870	1,045	13,870
Meal, herring.....	7,649	183,898	1,960	46,008	9,609	229,906
Oil:						
Salmon.....	22,000	1,760	17,821	4,010	39,821	5,770
Herring.....	2,057,695	211,818	448,014	44,801	2,505,709	256,619
Whale.....	-----	-----	736,011	76,379	736,011	76,379
Sperm.....	-----	-----	7,208	884	7,208	884
Total.....	-----	404,976	-----	189,512	-----	594,488

## COMMON AND SCIENTIFIC NAMES OF FISHERY PRODUCTS

In order to prevent misunderstanding from the use of common names employed in the tables and discussions, the following list of common and scientific names is given:

*Common and scientific names of the commercial fishery products caught in the United States and Alaska*

Common name as shown in Bureau reports	Other common names	Scientific names
Albacore	{ Longfin tuna False albacore	<i>Germo alalunga</i> (Pacific coast). <i>Euthynnus alleteratus</i> (Atlantic coast).
Alewives	{ Branch herring, wall-eyed or big-eyed herring. Blueback, glut herring	<i>Pomolobus pseudoharengus</i> .
Amberjack		<i>Pomolobus æstivalis</i> . <i>Seriola</i> species.
Anchovies		{ <i>Engraulis mordax</i> . <i>Anchoviella delicatissima</i> . <i>Anchoviella compressa</i> .
Angelfish		{ <i>Pomacanthus arcuatus</i> . <i>Angelichtys isabelita</i> .
Barracuda		{ <i>Sphyræna argentea</i> (Pacific coast). <i>Sphyræna barracuda</i> (Atlantic coast).
Black bass	{ Smallmouth bass Largemouth bass	<i>Micropterus dolomieu</i> . <i>Micropterus salmoides</i> .
Bluefish	Tailor	<i>Pomatomus saltatrix</i> .
Blue pike	Pike perch, blue pickerel (Canada).	<i>Stizostedion glaucum</i> .
Blue runner or hard-tail.	Runner	<i>Caranx crysos</i> .
Bonito		{ <i>Sarda sarda</i> . <i>Sarda chiliensis</i> .
Bowfin		<i>Amia calva</i> .
Buffalofish		<i>Ictiobus</i> species.
Bullhead		<i>Ameiurus</i> species.
Butterfish	Dollarfish	<i>Poronotus triacanthus</i> .
Burbot	Lawyer, ling	<i>Lota maculosa</i> .
Cabio	Coalfish, crab eater, cobia.	<i>Rachycentron canadus</i> .
Cabrilla	Rock bass	<i>Paralabrax</i> species.
Carp (German)		<i>Cyprinus carpio</i> .
Catfish		<i>Siluridæ</i> species.
Cero		<i>Scomberomorus regalis</i> .
Chubs	Tullibee in Canada; long-jaws, bluefin, blackfin in United States.	All <i>Leucichthys</i> except <i>artedi</i> (in Great Lakes).
Cigarfish	Scad	<i>Decapterus</i> species.
Cisco	Herring in Canada	<i>Leucichthys artedi</i> (Lake Erie only).
Cod	Codfish	{ <i>Gadus macrocephalus</i> (Pacific coast). <i>Gadus callarias</i> (Atlantic coast).
Corbina	Orange mouth corbina	<i>Cynoscion xanthulum</i> .
Cowfish	Trunkfish, chapin	<i>Ostracion</i> species.
Crappie	{ White crappie Black crappie, strawberry bass, calico bass.	<i>Pomoxis annularis</i> . <i>Pomoxis sparoides</i> .



*Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued*

Common name as shown in Bureau reports	Other common names	Scientific names
Crevalle-----		<i>Caranx hippos.</i>
Croaker-----	Crocus, hardhead-----	<i>Micropogon undulatus.</i>
Cunner-----	Chogset, blue perch, bergall.	<i>Tautoglabrus adspersus.</i>
Cusk-----		<i>Brosmius brosme.</i>
Dolly Varden trout---	Salmon trout, bull trout---	<i>Salvelinus parkei.</i>
Dolphin-----		<i>Coryphaena hippurus.</i>
Drum, black-----		<i>Pogonias cromis.</i>
Drum, red-----	Channel bass, redfish, spotted bass.	<i>Sciaenops ocellatus.</i>
Eels-----		<i>Anguilla rostrata.</i> <i>Leptocephalus conger.</i> <i>Gymnothorax mordax.</i> <i>Gymnothorax moringua.</i> <i>Thaleichthys pacificus.</i> Pleuronectidae species.
Eulachon-----	Candlefish-----	
Flounders-----	Dabs, blackbacks, lemon sole, winter flounder, summer flounder.	
Flyingfish-----		<i>Cysilurus californicus.</i>
Frigate mackerel-----	"Wahoo"-----	<i>Auxis thazard.</i>
Garfish-----	{ Billfish, poundfish (salt-water species).	{ Tylosurus species.
Gizzard shad-----	Nanny shad, mud shad---	{ Ablennes species.
Goldeye-----		<i>Dorosoma cepedianum.</i>
Goldfish-----	Sand perch-----	Hiodon species.
Goosefish-----		<i>Carassius auratus.</i>
Grayfish-----	{ Dogfish-----	<i>Lophius piscatorius.</i>
	{ Spiny dog-----	<i>Squalus sucklii</i> (Pacific coast).
	{ Smooth dog-----	<i>Squalus acanthias.</i>
Groupers-----	"Sea bass"-----	<i>Mustelus mustelus.</i>
Grunts-----	Margatefish, sailors choice (Key West).	{ Epinephelus species.
Haddock-----		{ Mycteroperca species.
Hagfish-----	Slimefish-----	Hæmulon species.
	{ Squirrel hake, Boston hake, ling, black hake, mud hake.	<i>Melanogrammus aeglefinus.</i>
Hake-----	{ Merluccio-----	<i>Myxine glutinosa.</i>
		Urophycis species (Atlantic coast).
Halibut-----		<i>Merluccius productus</i> (Pacific coast).
Halibut, "California"-----		<i>Hippoglossus hippoglossus.</i>
Hardhead-----		<i>Paralichthys californicus.</i>
Harvestfish-----	Starfish, pappyfish; butterfish (N.C.).	<i>Orthodon microlepidotus.</i>
Herring:-----		<i>Peprilus alepidotus.</i>
Lake-----	Herring-----	<i>Leucichthys artedi</i> (Great Lakes, except Erie).
Sea-----		{ <i>Clupea harengus</i> (Atlantic coast).
Herring smelt-----	Sea smelt-----	{ <i>Clupea pallasii</i> (Pacific coast).
Hickory shad-----	Tailor shad-----	<i>Argentina silus.</i>
Hog-choker-----		<i>Pomolobus mediocris.</i>
Hogfish-----	Capitaine, perro perro---	<i>Achirus fasciatus.</i>
		<i>Lachnolaimus maximus</i> (Florida).
Horse mackerel-----		<i>Trachurus symmetricus</i> (Pacific coast).
Jewfish-----		<i>Promicrops itaiara.</i>
Kingfish-----		<i>Scomberomorus cavalla.</i>

## Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Kingfish (California).....	Little roncador, croaker.....	<i>Genyonemus lineatus</i> .
King whiting.....	Northern whiting, kingfish, seamink.....	<i>Menticirrhus</i> species.
Ladyfish.....	Bonefish, bananafish.....	<i>Albula vulpes</i> .
Lake trout.....		<i>Cristivomer namaycush</i> .
Launce.....	Sand eel, lant, sand launce.....	<i>Ammodytes americanus</i> .
"Lingcod".....	Cultus cod, blue cod, buffalo cod, ling.....	<i>Ophiodon elongatus</i> .
Mackerel.....		<i>Scomber scombrus</i> (Atlantic coast).
Menhaden.....	Mossbunker, pogey.....	<i>Scomber diego</i> (Pacific coast).
Minnows.....		<i>Brevoortia tyrannus</i> .
Mojarro.....		Cyprinidae species.
Mooneye.....	Toothed herring.....	<i>Eucinostomus</i> species.
Moonfish.....		<i>Hiodon</i> species.
Mullet.....	Jumping mullet.....	<i>Vomer setipinnis</i> .
Mummichog.....	Mayfish, killifish.....	<i>Selene vomer</i> .
Muttonfish.....		Mugil species.
Paddlefish.....	Spoonbill cat.....	Fundulus species.
Parrotfish.....		<i>Lutianus analis</i> .
Perch (California).....	(See surfishes.).....	<i>Polyodon spathula</i> .
Permit.....	Great pompano.....	Scaridae species.
Pigfish.....	Hogfish (N.C.).....	<i>Trachinotus goodei</i> .
Pike or pickerel.....	Great Lakes pike.....	<i>Orthopristis chrysopterus</i> .
Pilchard.....	Sardine.....	<i>Esox reticulatus</i> .
Pilotfish.....		<i>Esox lucius</i> .
Pinfish.....	Bream, salt-water bream.....	<i>Sardinia cærulea</i> .
Pollock.....		<i>Naucrates ductor</i> .
Pompano.....		<i>Seriola zonata</i> .
Porgies.....	Porgee.....	<i>Lagodon rhomboides</i> .
Porkfish.....	Sisi.....	<i>Pollachius virens</i> .
Quillback.....	Spearfish or skimfish.....	<i>Trachinotus</i> species (Atlantic coast).
Roach.....	Shiner.....	<i>Palometa simillima</i> (Pacific coast).
Rock bass.....	Redeye, goggle-eye.....	<i>Calamus</i> species.
Rockfishes.....	Rock cod.....	<i>Anisotremus virginicus</i> .
Rosefish.....		Carpoides species.
Rudderfish.....	Blue bass, Green Fish.....	<i>Notemigonus crysoleucas</i> .
Sablefish.....	Halfmoon.....	<i>Ambloplites rupestris</i> (Mississippi River and tributaries).
Salmon:	Black cod.....	<i>Sebastodes</i> species (Pacific coast).
Atlantic.....		<i>Sebastes marinus</i> .
Pacific.....		<i>Girella nigricans</i> .
Blueback, red or sockeye.....		<i>Medialuna californiensis</i> .
Chinook or king.....	Tyee, Columbia, Sacramento, spring.....	<i>Anaplopoma fimbria</i> .
Chum or keta.....	Dog salmon.....	<i>Salmo salar</i> (Atlantic coast).
Humpback or pink.....		<i>Oncorhynchus nerka</i> .
Silver or coho.....		<i>Oncorhynchus tshawytscha</i> .
Steelhead.....		<i>Oncorhynchus keta</i> .
		<i>Oncorhynchus gorbusha</i> .
		<i>Oncorhynchus kisutch</i> .
		(See steelhead trout.)

*Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued*

Common name as shown in Bureau reports	Other common names	Scientific names
Sauger pike.....	Sand pike.....	<i>Stizostedion canadense</i> .
Sawfish.....	.....	<i>Pristis pectinatus</i> .
Scamp.....	.....	<i>Mycleropera phenax</i> .
Sculpin.....	.....	Cottidae species.
Scup.....	Paugy or porgy, fair maid.	Stenotomus species.
Sea bass.....	{ Black jewfish or black sea bass.	<i>Stereolepis gigas</i> (Pacific coast).
	{ Black sea bass.....	<i>Centropristes striatus</i> (Atlantic coast).
Sea bass, white (California).	.....	<i>Cynoscion nobilis</i> (Pacific coast).
Sea gar.....	Needlefish, billfish, houndfish.	Tylosurus species.
Sea robin.....	.....	Prionotus species.
Shad.....	American shad.....	<i>Alosa sapidissima</i> .
Sharks.....	.....	Carcharodon species; Mustelus species; Carcharhinus species; Sphyrna species.
Sheepshead (salt-water).	.....	<i>Archosargus probatocephalus</i> .
Sheepshead (fresh-water).	Drum, fresh-water.....	<i>Aplodinotus grunniens</i> .
Sheepshead (Pacific coast).	Redfish, flat head.....	<i>Pimelometopon pulcher</i> .
Silversides.....	Spearing.....	Menidia species.
Silver perch.....	Sand perch.....	<i>Bairdiella chrysura</i> .
Skates.....	.....	Raja species.
Skipper.....	"Billfish".....	<i>Scomberesox saurus</i> .
Smelt.....	.....	{ <i>Osmerus mordax</i> (Atlantic coast).
	.....	Argentinidae species (Pacific coast).
Snapper, Mangrove.....	Gray snapper.....	<i>Lutianus griseus</i> .
Snapper, red.....	.....	<i>Lutianus blackfordii</i> .
Snook.....	Robalo, sergeantfish.....	<i>Centropomus undecimalis</i> .
Sole.....	.....	<i>Psettichthys melanostictus</i> (Pacific coast).
Spadefish.....	.....	<i>Chaetodipterus faber</i> .
Spanish mackerel.....	.....	<i>Scomberomorus maculatus</i> .
Spearfish.....	{ Marlin.....	<i>Tetrapturus imperator</i> .
	.....	<i>Tetrapterus mitsukurii</i> (Pacific coast).
Splittail.....	.....	<i>Pogonichthys macrolepidotus</i> .
Spot.....	Lafayette, goody.....	<i>Leiostomus xanthurus</i> .
Squawfish.....	Sacramento pike.....	<i>Ptychocheilus grandis</i> .
Squeteague (gray).....	Gray trout, weakfish, trout.	<i>Cynoscion regalis</i> .
Squeteague (spotted).....	Spotted weakfish, spotted trout.	<i>Cynoscion nebulosus</i> .
Squirrelfish.....	.....	<i>Diplectrum formosum</i> .
Steelhead trout.....	Salmon trout.....	<i>Salmo gairdneri</i> .
Stingray.....	.....	Dasyatis species.
Striped bass.....	Rockfish, rock.....	<i>Roccus lineatus</i> .
Sturgeon.....	.....	Acipenser species.
Sturgeon, shovelnose.....	.....	<i>Scaphirhynchus platyrhynchus</i> .
Sucker.....	Fresh-water mullet.....	Catostomidae species.
Sunfish.....	.....	{ Lepomis species.
	.....	Centrarchidae species.
Surf fishes.....	.....	Embiotocidae species.

## Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Swellfish.....	Puffer, swell toad, balloonfish, globefish.	<i>Spheroïdes maculatus</i> .
Swordfish.....		<i>Xiphias gladius</i> .
Tang.....		Hepatus species.
Tarpon.....	Silver king.....	<i>Tarpon atlanticus</i> .
Tautog.....	Blackfish, oystersh.	<i>Tautoga onitis</i> .
Tenpounder.....	Elops.....	<i>Elops saurus</i> .
Thimble-eyed mackerel.	Bullseye.....	<i>Scomber colias</i> .
Tilefish.....		<i>Lopholatilus chamæleonticeps</i> .
Tomcod.....		<i>Microgadus tomcod</i> (Atlantic coast).
		<i>Microgadus proximus</i> (Pacific coast).
Tripletail.....		<i>Lobotes surinamensis</i> .
Tuna and tunalike fishes:		
Albacore.....	Longfin tuna.....	<i>Germo alalunga</i> .
Bluefin tuna.....	{ Tuna, leaping tuna, (Pacific coast). "Horse mackerel" (Atlantic coast).	{ <i>Thunnus thynnus</i> .
Bonito.....		{ <i>Sarda sarda</i> (Atlantic coast).
Skipjack.....		{ <i>Sarda chiliensis</i> (Pacific coast).
Yellowfin tuna.....	Striped tuna.....	<i>Euthynnus pelagys</i> .
Tullibee.....	(See chubs.)	<i>Neothunnus macropterus</i> .
Turbot.....	Greenland halibut, American turbot.	{ <i>Reinhardtius hippoglossoides</i> .
White bass.....	White lake bass.....	{ <i>Balistes carolinensis</i> .
Whitebait.....		<i>Roccus chrysops</i> .
		Small fry of any fish.
		{ <i>Coregonus clupeiformis</i> (Great Lakes).
Whitefish.....		{ <i>Caulolatilus princeps</i> (Pacific coast).
Whitefish (Menominee).		<i>Coregonus clupeaformis</i> .
White perch.....		<i>Morone americana</i> (Atlantic coast).
Whiting.....	Silver hake.....	<i>Merluccius bilinearis</i> .
Wolfish.....		<i>Anarhichas lupus</i> .
Yellow bass.....		<i>Morone interrupta</i> .
Yellow perch.....		<i>Perca flavescens</i> .
Yellow pike.....	Wall-eyed pike, pike perch, dore.	<i>Stizostedion vitreum</i> .
Yellowtail.....		{ <i>Ocyurus chrysurus</i> (Atlantic coast).
		{ <i>Seriola dorsalis</i> (Pacific coast).
Wahoo.....		<i>Acanthocybium solandri</i> .
Abalone.....		<i>Halotis</i> species.
Clams:		
Hard.....	Round clam, cherry-stone, quahog, little neck.	{ <i>Tivela stultorum</i> (Pacific coast).
		{ <i>Venus mercenaria</i> (Atlantic coast).
		<i>Venus mintoni</i> (Florida coast). <sup>3</sup>
Cockle.....		<i>Cardium corbis</i> .
Soft.....	Sand clam, soft-shelled clam, nannynose, maninose.	<i>Mya arenaria</i> .

## Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Clams—Continued.		
Surf	Skimmer	<i>Macra solidissima</i> .
Razor (Atlantic)		<i>Siliqua</i> species; <i>Tagelus</i> species.
Razor (Pacific)		<i>Siliqua patula</i> .
Pismo		<i>Tivela stultorum</i> (Pacific coast).
Conchs		{ <i>Strombus</i> species. <i>Busycon</i> species.
Crabs:		
Stone		<i>Menippi mercenaria</i> .
Soft	Soft-shelled crab, blue crab.	<i>Callinectes sapidus</i> .
Hard	{ Hard-shell crab, blue crab. Dungeness crab	Do. <i>Cancer magister</i> (Pacific coast).
King	Rock crab, hard crab	<i>Cancer irroratus</i> (Atlantic coast).
Spider	Horseshoe crab	<i>Limulus</i> .
	Toad crab	<i>Hyas coarctatus</i> .
Crawfish	Crayfish	{ <i>Cambarus</i> species (Atlantic coast). <i>Astacus</i> species (Pacific coast).
Lobsters:		
Common		<i>Homarus americanus</i> (Atlantic coast).
Spiny	Rock lobster, crayfish	{ <i>Panulirus interruptus</i> (Pacific coast). <i>Panulirus argus</i> (Atlantic coast).
Mussels:		
Sea		{ <i>Mytilus californianus</i> (Pacific coast). <i>Mytilus edulis</i> .
Freshwater		{ <i>Quadrula</i> species. <i>Lampsilis</i> species. <i>Symphynota</i> species. <i>Unio</i> species.
Octopus		<i>Octopus punctatus</i> (Pacific coast).
Oysters:		
Eastern		<i>Ostrea elongata</i> .
Western	Olympia	<i>Ostrea lurida</i> (Pacific coast).
Japanese (introduced).		<i>Ostrea gigas</i> .
Periwinkles		<i>Littorina</i> species.
Scallops:		
Sea		<i>Pecten magellanicus</i> .
Bay		{ <i>Pecten irradians</i> (Atlantic coast). <i>Pecten æquisulcatus</i> (Pacific coast). <i>Peneus setiferus</i> .
		<i>Peneus brasiliensis</i> (Atlantic and Gulf coasts).
Shrimp		<i>Pandalus</i> species (Pacific coast).
		<i>Pandalopsis</i> species (Pacific coast).
		<i>Crangon</i> species (Pacific coast).

*Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued*

Common name as shown in Bureau reports	Other common names	Scientific names
Snails-----	-----	Gastropoda species.
Squid-----	-----	<i>Loligo opalescens</i> (Pacific coast).
		<i>Loligo pealei</i> (Atlantic coast).
Turtles:		
Green-----	-----	<i>Chelonia mydas</i> .
Loggerhead-----	-----	<i>Thalassochelys caretta</i> .
Hawksbill-----	-----	<i>Chelonia inbricata</i> .
Snapping-----	Mud turtle, mossback-----	<i>Chelydra serpentina</i> .
Terrapin-----	Diamond-back terrapin-----	Malaclemmys species.
Frogs-----	-----	Rana species.
Irish moss-----	-----	<i>Chondrus crispus</i> .
Kelp-----	-----	Macrocystis species; Nereocystis species; Pelagophycus species; Alaria species.
Sponges:		
Glove-----	-----	<i>Spongia graminea</i> (Hyatt)
		<i>Euspongia officianalis</i> (L.).
Grass-----	-----	<i>Hippospongia equina cerebri-formis</i> .
Sheepswool-----	-----	<i>Hippospongia canaliculata gossypina</i> .
Yellow-----	-----	<i>Hippospongia equina elastica</i> .
Trepang-----	Sea cucumber-----	<i>Cucumaris frondosa</i> ; <i>Thyonobriareus</i> .

## STATISTICAL SURVEY PROCEDURE

### METHODS OF COLLECTION

In order that persons using the statistics in this report may judge as to their completeness and authenticity, there follows an outline of the methods employed by the Bureau in collecting fishery statistics. It will be noted that several methods are used. Each method has been carefully studied to obtain the best results with the available personnel.

*General fishery statistics.*—In the collection of general fishery statistics, data are usually obtained on the catch of fishery products and its value as landed by the fishermen, the quantity or number of each kind of gear used, the number of fishing boats, the number and net tonnage of fishing and transporting vessels, the number of wholesale establishments, the amount of wages and salaries paid in these establishments, the quantity and value of products prepared, and the number of persons engaged in each phase of the industry.

The scope of the coastal surveys includes the commercial fisheries of the oceans, bays, and coastal rivers as far inland as commercial fishing is important. This usually coincides with the range of commercial fishing for anadromous species. Statistics of the fisheries of the Mississippi River include the fisheries of the Mississippi River proper, as well as all tributaries wherein commercial fishing for either fish, crustaceans, or mollusks is prosecuted. Statistics of the lake fisheries include those prosecuted in the Great Lakes, adjacent bays, and the international lakes of northern Minnesota, as well as certain rivers having outlets into these waters.

Beginning in 1929 general fishery statistics have been collected on an annual basis for all of the marine and lake sections of the United States and Alaska, except that wholesale data were omitted for 1932.

In conducting these surveys it is the custom of the Bureau to dispatch agents to the districts to be surveyed early in the calendar year. (It should be noted that statistics on the catch of oysters for 1930 and subsequent years cover the calendar year. In previous years statistics for this mollusk were for the oyster season.) They obtain statistics on operations during the previous year. The agents conducting these surveys are trained men or recruits working under the close supervision of trained men. Recruits are permitted to work individually only after proving a satisfactory aptitude for the work during their training period. While it is impossible for the few agents available to interview each fisherman in a given locality, the more important ones are visited and a sufficient number of those of lesser importance are interviewed to obtain reliable information on their production. In practice, virtually all wholesale firms are visited, as well as captains of fishing vessels (those of 5 net tons or over) and also all the more important shore fishermen and representative small producers.

As an aid in locating fishermen, lists of vessels and motor-boat owners are obtained from local customhouses. It is also often possible to obtain the names of licensed commercial fishermen and occasionally some statistics of the catch from the various State fishery agencies. In the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained from the State agencies in recent years that only fragmentary surveys are made by the Bureau to supplement missing data. Virginia and Maryland have recently adopted very complete statistical systems.

For the Great Lakes and international lakes of northern Minnesota the Bureau obtains most of the catch statistics and usually the value of the catch direct from the State records. To obtain data on the fishermen, boats, vessels, and gear the Bureau conducts such personal surveys among the fishermen as may be necessary to supplement the State records. Annual catch statistics are available since 1913.

Agents are stationed at Seattle, Wash., and Terminal Island, Calif., who survey each of the Pacific Coast States annually to supplement data that are missing from the State records. In most cases the value of the catch is derived from dealers' records and from estimates of prices. In Washington and Oregon the offshore fisheries are surveyed separately for units of operation, catch, and value of the catch. In almost all other respects the statistics are as collected by the States. Statistics of the wholesale industry for this section are obtained largely by personal interview.

The fisheries of Alaska are conducted primarily by large operators and sworn statements are required from these operators concerning their operations. These are collected and compiled by the Alaska Division of this Bureau.

Statistics on the catch of fish collected in the above general canvasses are shown in this report on the basis of round weight, that is, the weight of the fish as caught, except in the Pacific Coast States, where "as landed" weights are shown. In general in the Pacific Coast States halibut is landed heads on but eviscerated; swordfish may be

landed headless and eviscerated; some salmon, especially that caught by troll lines, may be eviscerated; "lingcod", rockfishes, and sablefish may be landed eviscerated. The weight of cod caught off Alaska and shown in the Pacific coast tables has been converted to the basis of round weight.

Bulletins containing statistics for each section are released following the survey.

*Landings at certain important United States ports.*—Statistics of the landings at the principal New England ports (Boston and Gloucester, Mass., and Portland, Maine) are similarly obtained. An agent is permanently stationed at each of these ports. His duties include the obtaining of data on the quantity of fish landed each day by each fishing vessel, the value of such fish landed, information concerning the date of departure and arrival of the vessel, and he also indicates the grounds from which the fish were taken and the gear used in their capture. These data are forwarded to the Bureau, where compilations are made. Monthly statistical bulletins are issued for these landings as well as annual bulletins summarizing the year's activities.

Statistics of the landings of fish at Seattle, Wash., are collected by the Bureau's agent in that city. Landings are classified as those made by American fishing vessels and those received by Seattle wholesale dealers. The landings credited to United States fishing vessels are made by vessels operating distinctly as primary fishing units, usually in the offshore fisheries, while those credited as received by wholesale dealers are usually products of the shore fisheries collected mainly from points in Puget Sound and do not include fish received from Alaska or Canada, or landings made by the halibut fleet. Monthly statistical bulletins are issued for these landings as well as annual bulletins summarizing the year's activities.

Statistics on the landings of fish at New York City are obtained from J. H. Matthews, executive secretary of the Middle Atlantic Fisheries Association, while those for Groton, Conn., are obtained by the Bureau's agents. Statements of these landings are forwarded to the Bureau, where they are compiled. These statistics have not included the value of the catch. Monthly bulletins including these data are not issued; however, a summary is published in this document.

Statistics of the fishery products handled at the municipal wharf, Washington, D.C., are reported to the Bureau by agents of the city health department. They are not published in bulletin form, but a summary of the year's activities is published in the annual report of this Division.

*Atlantic mackerel fishery.*—Statistics on the catch by the Atlantic mackerel fleet are obtained by combining the figures of mackerel landed at Boston and Gloucester, Mass., and Portland, Maine, with those obtained by agents who in recent years have been stationed at other Atlantic ports where mackerel are landed. These agents obtain data on the fares of mackerel landed, similar to the data obtained on the landings by fishing vessels at the three New England ports. The figures include only the catches made by purse seine and drift gill net craft and are not complete for these gears for craft under 5 net tons capacity. Statistics of this fishery appear only in the annual reports of this Division, although the landings at the principal New England ports appear in the monthly and annual bulletins published for those ports.



*Shad and alewife fisheries.*—Owing to the importance of the Hudson and Potomac Rivers in the production of shad, surveys for statistics of the catch, value of the catch, and operating units are made annually. On the Potomac River similar statistics also are obtained for the alewife fishery. The surveys are conducted by agents in a manner similar to that employed in the collection of general fishery statistics, except that probably more fishermen are interviewed, as great care is exercised to make these canvasses as accurate as possible.

The State of New York obtains statistics for the fisheries of the Hudson River that closely parallel those desired by the Bureau for this fishery, which alleviates the work on this river.

Statistics of the shad and alewife fisheries are not published separately in bulletin form, but a summary of the year's activities is published in the annual report of this Division.

*Sponge market, Tarpon Springs.*—A large proportion of the total output of sponges in Florida is handled through the sponge exchange at Tarpon Springs. In view of this, the Bureau has obtained from a representative of the exchange annual statistics of the quantity and value of the sponges, by variety classification, handled through it annually. Statistics of the quantity of sponges handled through the exchange are not published in bulletin form, but a summary of the year's activities is published in the annual reports of this division.

*Pacific halibut fishery.*—Statistics of the Pacific halibut fishery are obtained by the Bureau's agent in Seattle, aided by Bureau representatives in Alaska, and the International Fisheries Commission. The fleet classification has been arbitrarily applied by including in the "Washington fleet" all United States and Alaska vessels that land more than half of their catch in that State. All other United States and Alaska vessels of the halibut fleet are included in the "Alaska fleet." Monthly and annual statistical bulletins are available on this fishery, being published along with the statistics of the landings of fishery products at Seattle, Wash.

*Canned fishery products and by-products.*—Beginning in 1921, the Bureau has made annual surveys for statistics of the canned fishery products and by-products industries. These are begun the first week in January of each year for statistics of the production in the preceding year. The surveys usually occupy 6 to 9 weeks' time. During this period agents visit each plant in the United States where there is a production of canned fishery products or by-products. They obtain statistics of the production and value of the production for each commodity. In some instances, where plants are not easily reached by regular transportation facilities, returns are obtained by mail.

The value shown for canned products constitutes the gross amount received by the packer at the production point, no deductions being made for commission or expenses.

Statistics of the canned fishery products and by-products produced in Alaska are received on the same sworn statements that include statistics of the general fisheries. An annual statistical bulletin is issued on this trade.

*Manufactured fishery products.*—Statistics were obtained for 1930 for the first time on the total production of the many fishery products manufactured in the marine and lakes sections of the United States. In 1931 these statistics were expanded to include the Mississippi River and tributaries, but because of curtailed appropriations none of

this material was obtained for 1932, except that made available through the canned fishery products and by-products, and packaged fish products surveys.

*Packaged-fish trade.*—Complete statistics of the annual production and value of fish packaged in the United States are obtained as a part of the survey for statistics of the canned fishery products and by-products industries. These statistics are published in bulletin form annually.

*Cold-storage holdings of fish.*—An arrangement has been made with the Bureau of Agricultural Economics, Department of Agriculture whereby statistics of the cold-storage holdings of the various species of fish, by sections of the United States, are furnished to this Bureau monthly. Included with statistics of the holdings are statements of the quantity of the various species of fish frozen and also the holdings of certain cured fish. Bulletins showing these statistics are issued monthly as well as annually.

*Foreign fishery trade.*—Statistics on the foreign fishery trade are obtained from compilations made by the Bureau of Foreign and Domestic Commerce. Statistics of all known fishery products imported or exported are assembled in one table and published annually in the report of this Division.

#### COMPILATION PRACTICES AND TERMS

Certain practices and terms of importance used in the compilation of fishery statistics are explained below.

*Days absent.*—In computing "days absent" for vessels landing fares at the various ports, the day of departure and the day of arrival are included; thus, a vessel leaving port on the 8th of the month and returning on the 15th of the month will be shown as being absent 8 days.

*Operating units.*—Operating units as referred to in this document include persons engaged and fishing craft and gear employed.

*Vessel.*—The term "vessel" refers to a craft having a capacity of 5 net tons or more.

*Boat.*—The term "boat" refers to a craft having a capacity of less than 5 net tons capacity.

*Incidental catch.*—The term "incidental catch" refers to the catch of certain species by a type of gear which ordinarily does not take appreciable amounts, if any, of such species.

*Percentages.*—Percentages are usually shown as whole numbers. Fractions of percents are dropped if less than five tenths, and the percentage is raised to the next higher integer if the fraction is greater than five tenths. If the fraction is exactly five tenths, the integer is raised or lowered to make it an even number.

*Converting.*—Many of the figures shown in the statistical tables published herewith have been reduced to thousands of pounds or dollars. In making these conversions the largest number from which a group of items is computed is raised or lowered to the nearest thousands place. If the number ends in an even 500, the thousands integer is raised or lowered to make it an even number. The individual items are changed to conform to the total thus obtained.

## CONVERSION FACTORS

It is the policy of the Bureau to show the detailed catch figures of all products in pounds for the sake of uniformity and for purposes of comparison. Following such a policy presents very definite problems. In the case of fish there is little difficulty since in very rare instances are such products reported in units of measure other than pounds. For shellfish, however, the units of measure may be bushels, sacks, barrels, or thousands of shellfish, gallons of meat, etc. These many units make standardization difficult, but when coupled with the wide variation in the requirements or definition of some of these units in the various States the problem becomes even more complex.

All bivalve mollusks are reported in pounds of meats in the detailed catch tables presented in this report. In addition there is presented a supplementary table for each section on the production in bushels. These supplementary tables also give the production of certain other shellfish, such as crabs, in number.

*Oysters.*—Probably the greatest problem in presentation of fishery statistics in uniform units of measure is in the case of oysters. Usually the production of oysters on the Atlantic and Gulf coasts is reported to Bureau agents in bushels and prior to the data obtained for the year 1930 conversion from bushels to pounds of meats was effected on the basis of a uniform yield of 7 pounds of meat to the bushel. There follows a table which gives the results of a study of the measures used for oysters in the various States and of the average yields per bushel. This table presents the factors that have been used in the oyster statistics given in this report.

*Measures and yields of oysters, 1932*

State	Capacity of State bushel	Variation from United States standard bushel		Market oysters	
				Yield per State bushel	Yield per standard bushel
	<i>Cubic inches</i>	<i>Cubic inches</i>	<i>Percent</i>	<i>Pounds of meat</i>	<i>Pounds of meat</i>
Massachusetts.....	2,150.4	-----	-----	6.56	6.56
Rhode Island.....	2,150.4	-----	-----	6.50	6.50
Connecticut.....	2,150.4	-----	-----	6.75	6.75
New York.....	2,150.4	-----	-----	7.00	7.00
New Jersey.....	2,257.3	+106.9	+5.0	8.98	8.55
Delaware.....	2,257.3	+106.9	+5.0	6.15	5.86
Maryland.....	2,801.5	+650.1	+30.2	6.66	5.11
Virginia.....	3,003.4	+853.0	+39.7	6.51	4.66
North Carolina.....	2,801.9	+651.5	+30.3	5.71	4.38
South Carolina.....	4,071.5	+1,921.1	+89.3	4.76	2.51
Georgia.....	2,753.4	+603.0	+28.0	5.69	4.45
Florida.....	3,214.1	+1,063.7	+49.4	3.29	2.20
Alabama.....	2,826.2	+675.8	+31.4	2.40	1.83
Mississippi.....	2,826.2	+675.8	+31.4	2.19	1.67
Louisiana.....	2,148.4	-2.0	-0.1	4.14	4.14
Texas.....	2,700.0	+549.6	+25.6	5.05	4.02

*Other mollusks.*—The following table shows the conversion factors for various mollusks other than oysters used in this report.

*Average yields of certain mollusks in pounds of meats per bushel, 1932*

State	Clams, hard		Clams, soft		Clams, surf	Clams, razor	Mussels, sea	Periwinkles	Scallops, bay	Scallops, sea	Conchs	Cockles
	Public	Private	Public	Private								
Maine.....	11		15				10	20		6.75		
Massachusetts.....	11		16.09		18	32	10	18	6.75	6.75		18
Rhode Island.....	11	11	15.61						6.75			18
Connecticut.....	10		14					20		6.75		
New York.....	8	8	16	16	12	32	10		5	6	18	
New Jersey.....	8.89	9.34	20	20	12.5		10			6		
Delaware.....	10						13					
Maryland.....	8											
Virginia.....	8								6	6		
North Carolina.....	8								5.5			
South Carolina.....	8											
Georgia.....	8											
Florida.....	8								5.3			

*Other conversion factors.*—The principal other conversion factors that have been used in this report are as follows:

Alewives.....	To convert number of fish to weight in pounds, multiply by 0.4.
Cod, large, salted.....	To convert to fresh-gutted weight, multiply by 1.90.
Cod, market, salted.....	To convert to fresh-gutted weight, multiply by 1.94.
Cod, scrod, salted.....	To convert to fresh-gutted weight, multiply by 1.98.
<b>Crustaceans:</b>	
Crabs, soft (Connecticut, New York, Virginia, and Maryland).	To convert number of crabs to weight in pounds, divide by 4.
Crabs, soft (North Carolina).....	To convert number of crabs to weight in pounds, divide by 3.63.
Crabs, soft (other States).....	To convert number of crabs to weight in pounds, divide by 3.
Crabs, hard (North Carolina).....	To convert number of crabs to weight in pounds, divide by 4.
Crabs, hard (South Carolina and Georgia).	To convert number of crabs to weight in pounds, divide by 2.
Crabs, hard (Florida).....	To convert number of crabs to weight in pounds, divide by 1.64.
Crabs, hard (Alabama and Texas).....	To convert number of crabs to weight in pounds, divide by 1.72.
Crabs, hard (Mississippi).....	To convert number of crabs to weight in pounds, divide by 1.92.
Crabs, hard (Louisiana).....	To convert number of crabs to weight in pounds, divide by 1.86.
Crabs, hard (other States).....	To convert number of crabs to weight in pounds, divide by 3.
Crabs, king.....	To convert number of crabs to weight in pounds, multiply by 3.75.
Crabs, rock.....	To convert number of crabs to weight in pounds, divide by 3.
Crabs, stone.....	To convert number of crabs to weight in pounds, multiply by 1.33.
Cusk, salted.....	To convert to fresh-gutted weight, multiply by 1.90.
Haddock, large, salted.....	To convert to fresh-gutted weight, multiply by 2.06.
Haddock, scrod, salted.....	To convert to fresh-gutted weight, multiply by 2.10.
Hake, large, salted.....	To convert to fresh-gutted weight, multiply by 1.90.

Hake, small, salted.....	To convert to fresh-gutted weight, multiply by 1.98.
Halibut, salted.....	To convert to fresh-gutted weight, multiply by 2.
Herring, salted.....	To convert to round weight, multiply by 1.50.
Mackerel, salted.....	To convert to round weight, multiply by 1.35.
Menhaden.....	To convert number of fish to weight in pounds, multiply by 0.6.
Oil (east coast).....	To convert gallons to pounds, multiply by 7.74.
Oil (west coast).....	To convert gallons to pounds, multiply by 7.5
Pollock, salted.....	To convert to fresh-gutted weight, multiply by 1.90.
Sponges, dried (Florida):	
Large wool.....	To convert number of bunches of sponges to weight in pounds, multiply by 2.5.
Small wool.....	To convert number of bunches of sponges to weight in pounds, multiply by 1.
Glove.....	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.
Grass.....	To convert number of bunches of sponges to weight in pounds, multiply by 2.5.
Wire.....	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.
Yellow.....	To convert number of bunches of sponges to weight in pounds, multiply by 1.5.

1. The first part of the report  
describes the general situation  
of the country and the  
state of the economy.  
2. The second part of the report  
describes the state of the  
economy and the state of the  
economy.

3. The third part of the report  
describes the state of the  
economy and the state of the  
economy.  
4. The fourth part of the report  
describes the state of the  
economy and the state of the  
economy.

5. The fifth part of the report  
describes the state of the  
economy and the state of the  
economy.



# ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1933 <sup>1</sup>

By WARD T. BOWER, *Chief, Division of Alaska Fisheries*

## CONTENTS

	Page		Page
INTRODUCTION.....	239	FISHING INDUSTRIES—Continued.....	
Visit of the Commissioner of Fisheries to Alaska.....	240	Whales.....	288
FISHERY INDUSTRIES.....	241	Clams.....	288
New fishery regulations.....	241	Shrimp.....	289
Annette Island Fishery Reserve.....	254	Crabs.....	289
Stream improvement.....	255	Japanese vessels in Bering Sea.....	290
Stream marking.....	255	Trout.....	290
Stream guards.....	255	Miscellaneous fishery products.....	290
Vessel patrol.....	256	FUR-SEAL INDUSTRY.....	291
Complaints and prosecutions.....	256	Pribilof Islands.....	291
Territorial fishery legislation.....	257	General administrative work.....	291
Territorial license tax.....	258	Transportation of supplies.....	291
Water-power projects in Alaska.....	258	Power vessel <i>Penguin</i> .....	292
Kuskokwim River.....	259	Roads.....	293
Yukon River.....	259	Buildings.....	293
Weirs for counting salmon escapement.....	260	Natives.....	294
Olive Cove.....	260	Census.....	294
Karluk River.....	260	Medical service.....	294
Chignik River.....	261	Schools.....	294
Chinik Creek.....	261	Savings accounts.....	295
Alitak Bay.....	261	Payments for taking fur-seal skins.....	295
Salmon life-history studies.....	261	Payments for taking fox skins.....	296
Observations on the escapement of salmon.....	262	Fur seals.....	296
Hatcheries.....	264	Killings.....	296
Extent of operations.....	264	Age classes.....	298
Hatchery rebates.....	264	Reserving operations.....	298
General statistics of the fisheries.....	265	Computation of fur-seal herd.....	298
Salmon.....	265	Foxes.....	299
Catch and apparatus.....	265	Trapping season of 1933-34.....	299
Canning.....	269	Reindeer.....	299
Changes in canneries.....	269	Fur-seal skins.....	300
New canneries.....	270	Shipments.....	300
Canneries not operated.....	270	Sales.....	300
Total canneries operated.....	272	Disposition of fur-seal skins taken at Pribilof Islands.....	303
Losses and disasters.....	274	Shipment and sale of fox skins.....	304
Statistics.....	274	Sea-otter skins.....	305
Pack in certain districts.....	278	Fur-seal patrol.....	305
Mild curing.....	279	United States Coast Guard.....	305
Pickling.....	280	Bureau of Fisheries.....	305
Fresh salmon.....	281	Sealing privileges accorded aborigines.....	306
Freezing.....	282	Japanese sealskins delivered to the United States.....	306
Dry-salted, dried, and other miscellaneous salmon products.....	282	COMPUTATION OF FUR SEALS, PRIBILOF ISLAND, 1933.....	306
Byproducts.....	282	Bulls.....	307
Herring.....	283	Average harem.....	308
Statistical summary.....	284	Pups and cows.....	309
Halibut.....	286	Mortality of seals at sea.....	310
Statistical summary.....	286	Complete computation.....	310
Cod.....	287		

## INTRODUCTION

The Bureau's work in Alaska, which pertains chiefly to the conservation of the fisheries and the management of the Pribilof Islands fur-seal industry, was carried on along the same general plan as in previous years, although some phases of the program were

<sup>1</sup> Appendix II to the Report of the U.S. Commissioner of Fisheries for 1934. Approved for publication, May 31, 1934.

considerably curtailed because of the limitation of funds. The Commissioner of Fisheries was in Alaska for a number of weeks inspecting both the fishery and fur-seal activities.

In the patrol of the fishing grounds to assure enforcement of the laws and regulations approximately 200 persons, including the crews on 14 vessels belonging to the Bureau and 2 chartered boats, were employed for varying periods. Observations were made of the extent and condition of the salmon runs and of the proportion that escaped capture. From time to time modifications were made in the regulations either to curtail commercial fishing in order to permit a more adequate seeding of the spawning beds, or to relax existing restrictions if the situation warranted.

Weirs for counting the escapement of spawning salmon were operated in only a few streams where important scientific studies of the biology of the Pacific salmon have been in progress for a number of years, or where the installation and maintenance of the structure could be accomplished by the stream guard in that locality in conjunction with his other duties. The operation of fish-cultural stations in Alaska by the Bureau was discontinued.

Reports of commercial fishery operations were collected, and data compiled therefrom are published herewith.

Sealing operations at the Pribilof Islands resulted in the take of 54,550 fur-seal skins, or 5,214 more than the number obtained in 1932. Practically all the killings were of 3-year-old surplus male seals. Observations indicated that the number of this age class not taken up in the drives was ample to provide for the future breeding stock. The computation of the fur-seal herd as of August 10, 1933, showed 1,318,568 animals of all classes, an increase of 98,607 over the number computed for the previous year. The fox herds on St. Paul and St. George Islands were fed during the winter and yielded 939 pelts in the 1933-34 season.

Some work was accomplished in the repair and improvement of buildings for the use of natives and for the sealing industry, and in the construction of roads to facilitate the delivery of sealskins from the killing grounds to the central plants.

Through the cooperation of the Navy Department the general shipment of supplies for the Pribilof Islands was forwarded on the U.S.S. *Vega*, and the sealskins taken during the season were brought out on the return trip to Seattle. Valuable assistance was rendered also by the United States Coast Guard in maintaining a patrol for the protection of the fur seals.

Two public-auction sales of fur-seal skins were held in 1933, at both of which fox skins were sold also.

Acknowledgment is made of the assistance rendered by members of the Bureau's staff in the preparation of this document.

#### VISIT OF THE COMMISSIONER OF FISHERIES TO ALASKA

The Commissioner of Fisheries sailed from Seattle aboard the *Brant* on June 6 for Alaska, where an extended survey of fishery conditions was made in all important salmon districts as far west as Bristol Bay. About 20 public hearings were held at various places to give all interested persons an opportunity to express their views.



Commissioner Bell was accompanied by Agent L. G. Wingard and by Dr. Willis H. Rich, of Stanford University, who for many years has been identified with the scientific studies of the Pacific salmon.

On July 6 Commissioner Bell was at St. Paul Island to observe the sealing activities. The *Penguin* was used for the voyage from Naknek to the Pribilofs and thence to Unalaska. At the latter point transfer was made to the *Brant*, which proceeded to Juneau, calling en route at Squaw Harbor, Chignik, Karluk, and other ports. Airplane travel between a number of points in southeast Alaska expedited the Commissioner's work in that district.

The press of other important business shortened the Alaska trip somewhat from the schedule originally planned, and the Commissioner returned to Seattle on July 22. After attending to various fishery matters in the Northwest he left for Washington, where he arrived on August 7.

### FISHERY INDUSTRIES

As in corresponding reports for previous years, the Territory of Alaska is here considered in the three coastal geographic sections, generally recognized, as follows: (1) Southeast Alaska—embracing all that narrow strip of mainland and the numerous adjacent islands from Portland Canal northwestward to and including Yakutat Bay; (2) central Alaska—the region on the Pacific from Yakutat Bay westward, including Prince William Sound, Cook Inlet, and the southern coast of Alaska Peninsula, to Unimak Pass; and (3) western Alaska—the north shore of the Alaska Peninsula, including the Aleutian Islands westward from Unimak Pass, Bristol Bay, and the Kuskokwim and Yukon Rivers. These divisions are solely for statistical purposes and do not coincide with areas established in departmental regulations.

Detailed reports and statistical tables dealing with the various fishery industries are presented herewith, and there are also given the important features of certain subjects that were the objects of special investigation or inquiry.

### NEW FISHERY REGULATIONS

The regulations for the protection of the fisheries of Alaska, issued December 20, 1932, were amended by the following regulations issued by the Acting Secretary of Commerce under the dates indicated:

[January 6, 1933]

#### ALASKA PENINSULA AREA

*Salmon fishery.*—1. Regulation no. 23 (b) is amended to read as follows: (1) Unimak Island: Along the coast on the west and south sides of Ikatan Bay from a point on False Pass (Isanotski Strait) indicated by a marker to a point at 54 degrees 46 minutes 44 seconds north latitude, 163 degrees 21 minutes 32 seconds west longitude, and from a point at 54 degrees 45 minutes 10 seconds north latitude, 163 degrees 19 minutes 30 seconds west longitude to a point on Louisiana Cove at 54 degrees 45 minutes 58 seconds north latitude, 163 degrees 8 minutes 52 seconds west longitude; and (2) mainland along the north side of Ikatan Bay within 2,500 feet of a point at 54 degrees 48 minutes 52 seconds north latitude, 163 degrees 18 minutes 38 seconds west longitude.

2. Regulation no. 23 (n) is amended to read as follows: Unga Island: East coast from a point at 55 degrees 12 minutes 10 seconds north latitude, 160

degrees 29 minutes 42 seconds west longitude, southerly and easterly to a point at 55 degrees 11 minutes 30 seconds north latitude, 160 degrees 27 minutes 30 seconds west longitude.

#### COOK INLET AREA

*Salmon fishery.*—Regulation no. 2 is amended to read as follows: The 36-hour weekly closed period for salmon fishing prescribed by section 5 of the act of June 6, 1924, is hereby extended to include the period from 6 o'clock antemeridian of Saturday of each week to 6 o'clock antemeridian of the Monday following, making a weekly closed period of 48 hours: *Provided*, That this extension of 12 hours closed period each week shall not be effective in the period from July 14 to August 1.

#### SOUTHEASTERN ALASKA AREA

##### ICY STRAIT DISTRICT

*Salmon fishery.*—Regulation no. 16 is amended to read as follows: Commercial fishing for salmon, except by trolling, is prohibited in Glacier Bay within a line from Point Carolus to Point Gustavus.

[February 28, 1933]

#### YUKON-KUSKOKWIM AREA

*Salmon fishery.*—Regulation no. 4 is amended to read as follows: King-salmon gill nets shall have a mesh of at least  $8\frac{1}{2}$  inches stretched measure between knots, red-salmon gill nets of linen webbing shall have a mesh of at least  $5\frac{1}{2}$  inches stretched measure between knots, and red-salmon gill nets of cotton webbing shall have a mesh of at least  $5\frac{1}{4}$  inches stretched measure between knots as measured when actually in use. No red-salmon gill net shall be over 28 meshes deep.

#### ALASKA PENINSULA AREA

*Salmon fishery.*—Regulation no. 17 is amended to read as follows: Commercial fishing for salmon along the mainland shore on the south side of Alaska Peninsula from a point on the coast 1 statute mile northwesterly of the outer extremity of Moss Cape to Castle Cape is prohibited prior to July 1 in each year: *Provided*, That fishing with gill nets along the mainland shore and adjacent islands between Kupreanof Point and Castle Cape may begin on June 1 in each year.

#### ALEUTIAN ISLANDS AREA

*Herring fishery.*—1. Commercial fishing for herring, except for bait purposes, by means of any seine is prohibited except in the period from July 15 to October 31, both dates inclusive.

2. Regulation no. 5 is amended to read as follows: Commercial fishing for herring, except for bait purposes, by means of any seine is prohibited west of 166 degrees west longitude.

3. Regulation no. 6 is amended to read as follows: Commercial fishing for herring, including bait fishing, by means of any purse seine more than 1,400 meshes in depth, more than 180 fathoms in length, or of mesh less than  $1\frac{1}{2}$  inches stretched measure between knots is prohibited.

#### COOK INLET AREA

*Salmon fishery.*—No trap shall be permitted to operate in the season of 1933 as follows:

1. Along the mainland coast on the east side of Cook Inlet (a) from 60 degrees 46 minutes north latitude to 60 degrees 45 minutes 20 seconds north latitude; (b) from 151 degrees 18 minutes 45 seconds west longitude to 151 degrees 20 minutes west longitude; (c) from 60 degrees 39 minutes 10 seconds north latitude to 60 degrees 38 minutes 34 seconds north latitude; (d) from 60 degrees 37 minutes 44 seconds north latitude to 60 degrees 37 minutes 10 seconds north latitude; (e) from 60 degrees 36 minutes 10 seconds north lati-

tude to a point  $2\frac{1}{2}$  statute miles north of the mouth of Kenai River; (f) from a point  $2\frac{1}{2}$  statute miles south of the mouth of Kenai River to 60 degrees 28 minutes 10 seconds north latitude; (g) from 60 degrees 27 minutes 50 seconds north latitude to 60 degrees 27 minutes north latitude; (h) from a point  $2\frac{1}{2}$  statute miles south of the mouth of Kasilof River to 60 degrees 21 minutes 10 seconds north latitude; (i) from 60 degrees 20 minutes north latitude to 60 degrees 19 minutes 39 seconds north latitude; (j) from 60 degrees 11 minutes 5 seconds north latitude to 60 degrees 12 minutes 20 seconds north latitude; and (k) within 2,500 feet of a point at 59 degrees 49 minutes north latitude, 151 degrees 50 minutes 10 seconds west longitude. (14k.)

2. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 42 minutes 4 seconds north latitude, 151 degrees 47 minutes 50 seconds west longitude, to a point at 59 degrees 41 minutes 33 seconds north latitude, 151 degrees 46 minutes 30 seconds west longitude. (14l.)

3. Along the mainland coast on the east side of Cook Inlet (a) on the west side of Nubble Point Spit within 1,200 feet of a point at 59 degrees 28 minutes 45 seconds north latitude, 151 degrees 35 minutes 6 seconds west longitude, and (b) within 1,000 feet of a point at 59 degrees 28 minutes 30 seconds north latitude, 151 degrees 37 minutes west longitude. (14m.)

4. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 26 minutes 30 seconds north latitude, 151 degrees 46 minutes west longitude, westerly to a point at 59 degrees 26 minutes 40 seconds north latitude, 151 degrees 46 minutes 45 seconds west longitude. (14n.)

5. Along the mainland coast on the east side of Cook Inlet within 1,000 feet of a point at 59 degrees 25 minutes 35 seconds north latitude, 151 degrees 52 minutes west longitude. (14o.)

6. Along the mainland coast on the east side of Cook Inlet from a point at 59 degrees 21 minutes 28 seconds north latitude, 151 degrees 55 minutes west longitude, southwesterly to a point at 59 degrees 19 minutes 20 seconds north latitude, 151 degrees 58 minutes 30 seconds west longitude. (14p.)

The number and letter after each regulation refer to the original regulation as printed in Department of Commerce Circular No. 251, nineteenth edition, dated December 20, 1932, and have been included herein for convenience in referring to the original regulation.

#### PRINCE WILLIAM SOUND AREA

*Salmon fishery.*—No trap shall be permitted to operate in the season of 1933 as follows:

1. Along the coast of Squire Island within  $\frac{1}{2}$  statute mile of its southern extremity. (12b.)

2. Eastern coast of Chenega Island from a point at 60 degrees 17 minutes 10 seconds north latitude to a point 1 statute mile eastward of Chenega Village. (12c.)

3. Eastern coast of Culross Island: (a) Within 5,000 feet northeasterly of a point on the southeast coast at 148 degrees 8 minutes 45 seconds west longitude, and (b) from 60 degrees 43 minutes 45 seconds north latitude northerly to a point at 60 degrees 45 minutes north latitude, 148 degrees 8 minutes 30 seconds west longitude. (12e.)

4. Within 1 statute mile eastward of the southwestern extremity of Naked Island. (12f.)

5. Along the mainland eastward and northward from the outermost extremity of Point Pellew to 60 degrees 51 minutes north latitude. (12g.)

6. Along the mainland within 1 statute mile of the outer extremity of Granite Point, near Fairmount Island. (12h.)

7. Western side of Valdez Arm from Point Freemantle to 60 degrees 56 minutes 30 seconds north latitude. (12i.)

8. Southwest coast of Bligh Island from 60 degrees 48 minutes 37 seconds north latitude to 146 degrees 44 minutes 20 seconds west longitude. (12j.)

9. Within  $\frac{1}{2}$  statute mile of the southwestern extremity of Bidarka Point. (12k.)

10. Mainland coast from a point at 60 degrees 40 minutes 56 seconds north latitude, 146 degrees 39 minutes 36 seconds west longitude, to a point east of Knowles Head at 146 degrees 36 minutes 20 seconds west longitude. (12o.)

11. From a point on the coast 1 statute mile northwestward of the light at Gravina Point to a point on the coast 2 statute miles northwestward of the light at Gravina Point. (12q.)

12. Hinchinbrook Island: Within 3,000 feet, measured westerly along the north side of a peninsula, from a point at 60 degrees 28 minutes 47 seconds north latitude, 146 degrees 23 minutes 27 seconds west longitude. (12*t*.)

13. From a point on the coast at 60 degrees 28 minutes north latitude northward to the light at Johnstone Point. (12*w*.)

14. Hinchinbrook Island: From a point on the coast  $2\frac{1}{2}$  statute miles north of the southwestern extremity of Bear Cape northward to a point at 60 degrees 24 minutes north latitude. (12*x*.)

15. Montague Island: Western coast from a point south of Macleod Harbor at 59 degrees 51 minutes 45 seconds north latitude to 59 degrees 50 minutes 49 seconds north latitude. (12*z*.)

16. Montague Island: Western coast from Point Woodcock to a point at 59 degrees 55 minutes 30 seconds north latitude (12*aa*.)

17. Montague Island: Western coast (*a*) from 60 degrees 4 minutes 30 seconds north latitude to 60 degrees 5 minutes 30 seconds north latitude, and (*b*) from 60 degrees 7 minutes 30 seconds north latitude to 60 degrees 9 minutes 45 seconds north latitude. (12*bb*.)

18. Montague Island: Northern coast (*a*) from Graveyard Point to 60 degrees 21 minutes 41 seconds north latitude, 147 degrees 9 minutes 47 seconds west longitude, and (*b*) from a point 1 statute mile southwest of Montague Point to Montague Point. (12*dd*.)

The number and letter after each regulation refer to the original regulation as printed in Department of Commerce Circular No. 251, nineteenth edition, dated December 20, 1932, and have been included herein for convenience in referring to the original regulation.

#### SOUTHEASTERN ALASKA AREA

##### WESTERN DISTRICT

*Salmon fishery.*—Regulation no. 19 (*m*) is amended to read as follows: Admiralty Island: West coast (1) from a point  $\frac{3}{4}$  statute mile north of Parker Point to 57 degrees 47 minutes north latitude, (2) from 57 degrees 49 minutes 55 seconds north latitude to 57 degrees 51 minutes north latitude, and (3) from 57 degrees 53 minutes 30 seconds north latitude to 58 degrees 2 minutes north latitude.

##### EASTERN DISTRICT

*Salmon fishery.*—1. Regulation no. 14 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 28 minutes north latitude.

2. Regulation no. 16 (*p*) is amended to read as follows: Kuiu Island: North-west coast (1) within 2,500 feet of a point at 56 degrees 33 minutes 9 seconds north latitude, 134 degrees 17 minutes 55 seconds west longitude, (2) from a point 1 statute mile north of the north side of the entrance to Washington Bay to 56 degrees 45 minutes 50 seconds north latitude, (3) from 56 degrees 47 minutes 45 seconds north latitude to 56 degrees 48 minutes 5 seconds north latitude, and (4) from 56 degrees 50 minutes 20 seconds north latitude to the point at the east side of the entrance to Band Cove.

##### SOUTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 14 (*g*) is amended to read as follows: Long Island, east of Dall Island: (1) Within 2,500 feet of a point at 54 degrees 56 minutes 13 seconds north latitude, 132 degrees 43 minutes 5 seconds west longitude, and (2) east and west coasts within 2,500 feet measured along the coast from 54 degrees 46 minutes 15 seconds north latitude.

2. Regulation no. 14 (*l*) is amended to read as follows: (1) Coast line of unnamed island within 2,500 feet of a point at 54 degrees 45 minutes 33 seconds north latitude, 132 degrees 22 minutes 17 seconds west longitude, and (2) within 2,500 feet of the northwestern extremity of the unnamed island at 54 degrees 43 minutes 9 seconds north latitude, 132 degrees 19 minutes 17 seconds west longitude.

##### ALL DISTRICTS

The regulations for the protection of the fisheries of southeastern Alaska as described in Department of Commerce Circular No. 251, nineteenth edition, issued December 20, 1932, and subsequent supplements thereto, are based upon

Coast and Geodetic Survey charts which have been prepared on the southeastern Alaska datum and not on charts which have been recently reissued on the North American 1927 datum.

[March 2, 1933]

#### PRINCE WILLIAM SOUND, COPPER RIVER, AND BERING RIVER AREAS

*Clam fishery.*—1. Regulation no. 3 is amended to read as follows: The taking of razor clams for commercial purposes is prohibited from July 1 to August 15, both dates inclusive, in each calendar year.

2. Regulation no. 4 is amended to read as follows: In the open season from January 1 to June 30, both dates inclusive, there shall not be taken in the Prince William Sound, Copper River, and Bering River Areas, a combined total of more than 800,000 pounds of razor clams, including shells, or 20,000 cases upon the basis of 48 one-half pound cans per case.

3. Regulation no. 5 is amended to read as follows: In the open season from August 16 to December 31, both dates inclusive, there shall not be taken in the Prince William Sound, Copper River, and Bering River Areas, a combined total of more than 400,000 pounds of razor clams, including shells, or 10,000 cases upon the basis of 48 one-half pound cans per case.

#### SOUTHEASTERN ALASKA AREA

##### WESTERN DISTRICT

*Salmon fishery.*—Regulation no. 17 is amended to read as follows: Commercial fishing for salmon is prohibited (1) in all bays tributary to Tenakee Inlet and in the waters of Tenakee Inlet west of 135 degrees 40 minutes west longitude, and (2) within 1 statute mile of the mouths of all salmon streams in Freshwater Bay: *Provided*, That these prohibitions shall not apply to trolling from January 1 to 6 o'clock postmeridian August 24.

##### EASTERN DISTRICT

*Salmon fishery.*—1. Regulation no. 17 (e) is amended to read as follows: Gambier Bay, east coast of Admiralty Island: All waters west of 134 degrees 3 minutes west longitude.

2. Regulation no. 17 (n) is amended to read as follows: Saginaw Bay, northwest coast of Kuiu Island: All waters of the bay within a line from a point on the southwest shore at 56 degrees 51 minutes 30 seconds north latitude to a point on the northeast shore at 56 degrees 53 minutes north latitude.

#### NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 14 is amended to read as follows: Commercial fishing for salmon is prohibited in all waters of Bradfield Canal east of 131 degrees 49 minutes west longitude: *Provided*, That this prohibition shall not apply to trolling prior to 6 o'clock antemeridian June 1 and after 6 o'clock postmeridian September 30 in each year.

2. All commercial fishing for salmon is prohibited within 1 statute mile outside the mouth of Anan Creek.

3. Regulation no. 15 is amended to read as follows: Commercial fishing for salmon is prohibited in all waters of Blake Channel and Eastern Passage between 56 degrees 14 minutes north latitude and 132 degrees 6 minutes west longitude, and in all bays and inlets tributary to Eastern Passage: *Provided*, That this prohibition shall not apply to trolling prior to 6 o'clock antemeridian June 1 and after 6 o'clock postmeridian September 30 in each year.

4. Regulation no. 18 (a) is amended to read as follows: Moira Sound, east coast of Prince of Wales Island: South Arm south of 54 degrees 57 minutes 30 seconds north latitude, all waters in Frederick Cove, Kegan Cove, and within 1,000 yards of the mouths of all salmon streams in Johnson Cove.

5. Regulation no. 18 (d) is amended to read as follows: Skowl Arm, Prince of Wales Island: McKenzie Inlet south of 55 degrees 21 minutes 30 seconds north latitude, and Polk Inlet south of 55 degrees 25 minutes 10 seconds north latitude.

6. Regulation no. 18 (f) is amended to read as follows: Kasaan Bay, east coast of Prince of Wales Island: Within a line from a point at 55 degrees 33

minutes 15 seconds north latitude, 132 degrees 30 minutes 54 seconds west longitude, to a point at 55 degrees 36 minutes 15 seconds north latitude, 132 degrees 30 minutes 15 seconds west longitude.

7. Regulation no. 18 (*g*) is amended to read as follows: Thorne and Tolstoi Bays, east coast of Prince of Wales Island: Within 1 statute mile of the mouths of all salmon streams, and all waters of Thorne Bay west of 132 degrees 28 minutes 40 seconds west longitude.

8. Regulation no. 18 (*aa*) is amended to read as follows: Affleck Canal, southeastern coast of Kuiu Island: Bear Harbor north of 56 degrees 15 minutes north latitude, and East Arm north of 56 degrees 17 minutes 30 seconds north latitude.

9. Regulation no. 18 (*dd*) is amended to read as follows: El Capitan Passage, between Kosciusko Island and Prince of Wales Island: El Capitan Passage and contiguous waters between 56 degrees 7 minutes 30 seconds north latitude and a line extending due north from the point of land on Kosciusko Island at 56 degrees 8 minutes 47 seconds north latitude, 133 degrees 27 minutes 40 seconds west longitude, including all waters of Devilfish Bay.

#### SOUTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—Regulation no. 15 (*l*) is amended to read as follows: Hunter Bay, southwest coast of Prince of Wales Island: All waters in the north arm of Hunter Bay, and within 1 statute mile outside the mouths of all salmon streams.

#### SOUTHERN DISTRICT

*Salmon fishery.*—1. Regulation no. 17 (*h*) is amended to read as follows: Smeaton Bay, indenting mainland: Within 1 statute mile outside the mouth of the salmon stream in Wilson Arm, and all waters of Bakewell Arm east of 130 degrees 40 minutes west longitude.

2. Regulation no. 17 (*o*) is amended to read as follows: Naha Bay, west shore of Revillagigedo Island: Within 1 statute mile of the falls at the outlet of Roosevelt Lagoon.

[March 7, 1933]

#### BERING RIVER AREA

*Salmon fishery.*—1. Commercial fishing for salmon is prohibited prior to 6 o'clock antemeridian May 15 and from 6 o'clock postmeridian July 5 to 6 o'clock antemeridian August 10 in each year.

2. Prior to 6 o'clock antemeridian June 1 in each year commercial fishing with nets of mesh less than 8½ inches stretched measure between knots is prohibited.

3. From June 1 to July 5, both dates inclusive, the 36-hour closed period for salmon fishing prescribed by section 5 of the act of June 6, 1924, is hereby extended to include the period from 6 o'clock antemeridian of Saturday of each week until 6 o'clock antemeridian of the Monday following, making a weekly closed period of 48 hours.

4. Commercial fishing for salmon is prohibited after 6 o'clock postmeridian September 20 in each calendar year.

5. Commercial fishing for salmon shall be conducted solely by drift gill nets without the attachment of anything to obstruct their free movement through the water at all times: *Provided*, That gill nets attached to anchored boats or other anchored floating equipment may also be used from 6 o'clock antemeridian August 10 to 6 o'clock postmeridian September 20 in each calendar year.

6. Each gill net in operation shall be marked by a cluster of floats or corks at the ends, and double floats or corks shall be attached to the cork line at 25-fathom intervals. The clusters of floats or corks at the ends and the double floats or corks at the 25-fathom intervals of every red-salmon and silver-salmon gill net shall be painted bright red. The clusters of floats or corks at the ends and the double floats or corks at the 25-fathom intervals of every king-salmon gill net shall be painted white. The clusters at the ends of all gill nets shall also be legibly and plainly marked with the initials of the operator. In addition, each red-salmon and silver-salmon gill net shall be marked by red kegs attached to the clusters of floats or corks at the ends, and each king-salmon gill net shall be marked with white kegs attached to the clusters of floats or corks at the ends.

7. Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat, or in use by such boat, shall not exceed 175 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian June 1 to 6 o'clock postmeridian June 15 any gill-net boat in the Bering River area may carry and operate not to exceed 75 fathoms of net of mesh not less than  $8\frac{1}{2}$  inches stretched measure between knots in addition to 175 fathoms of smaller mesh net.

8. The trailing of web behind any fishing boat is prohibited above the markers fixing closed waters.

9. Anchored gill nets shall be operated in substantially a straight line.

#### SOUTHEASTERN ALASKA AREA

*Shrimp fishery.*—Commercial fishing for shrimps is prohibited in the period from April 1 to April 30, both dates inclusive, in each year.

[March 23, 1933]

#### PRINCE WILLIAM SOUND AREA

*Salmon fishery.*—1. Regulation no. 13 (*f*) is amended to read as follows: Simpson Bay: All waters within 500 yards of the mouth of the stream at the head of the west arm of the bay.

2. Regulation no. 13 (*g*) is amended to read as follows: Sheep Bay: All waters within 1,000 yards of the mouth of the stream at the head of the bay.

3. Regulation no. 13 (*h*) is amended to read as follows: Gravina River: All waters within 1,000 yards of the mouth of the river.

4. Regulation no. 13 (*l*) is amended to read as follows: Whalen Bay, south side of Port Fidalgo: All waters east of 146 degrees 15 minutes 30 seconds west longitude.

5. Regulations nos. 13 (*r*) and 13 (*s*) are amended to read as follows: Unakwik Inlet and tributary waters, indenting mainland on north shore of Prince William Sound: All waters within 1,000 yards of the mouth of any salmon stream.

6. Regulation no. 13 (*v*) is amended to read as follows: Port Nellie Juan: All waters within 500 yards of the mouth of any salmon stream.

7. Regulation no. 13 (*y*) is amended to read as follows: Jackpot Bay: All waters within a line indicated by markers located at the entrance to the narrows in the bay.

8. Regulation no. 13 (*z*) is amended to read as follows: Port Bainbridge: All waters in Hogg Bay within 500 yards of the mouth of any salmon stream.

9. Regulation no. 13 (*bb*) is amended to read as follows: Bay of Isles, indenting east shore of Knight Island: All waters within 1,000 yards of the mouth of the stream at the head of the west arm of the bay.

#### BERING RIVER AREA

*Salmon fishery.*—All commercial fishing for salmon is prohibited in Controller Bay and contiguous waters north of a line extending due east from Point Hey.

#### SOUTHEASTERN ALASKA AREA

##### WESTERN DISTRICT

*Salmon fishery.*—1. Regulation no. 6 is amended to read as follows: Commercial fishing for salmon, other than trolling, north of a true line eastward from the southeastern extremity of Point Couverden is prohibited prior to 6 o'clock antemeridian June 15 and after 6 o'clock postmeridian August 10 in each calendar year: *Provided*, That this prohibition shall not apply to the use of gill nets from 6 o'clock postmeridian August 10 to 6 o'clock postmeridian August 20 and from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30 in Lynn Canal and contiguous waters north of the north end of Sullivan Island.

2. Regulation no. 14 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 34 minutes 10 seconds north latitude.

3. Regulation no. 15 is amended to read as follows: Commercial fishing for salmon in Chilkat Inlet is prohibited north of 59 degrees 10 minutes 24 seconds north latitude, except that in these closed waters outside of a line from Green Point passing across the southern shore of Pyramid Island such fishing is permitted by gill nets from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30 in each year.

4. Regulation no. 16 is amended to read as follows: Commercial fishing for salmon in Chilkoot Inlet within a line 1 statute mile from the mouth of Chilkoot River is prohibited, except that in these closed waters outside of a line 1,000 yards from the mouth of Chilkoot River such fishing is permitted by gill nets from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30 in each year.

#### EASTERN DISTRICT

*Salmon fishery.*—Regulation no. 1 in supplement No. 251-19-2 is amended to read as follows: Purse seines are prohibited in Lynn Canal and contiguous waters north of 58 degrees 34 minutes 10 seconds north latitude.

[March 31, 1933]

#### ALASKA PENINSULA AREA

*Salmon fishery.*—Regulation no. 2 in supplement No. 251-19-1 is amended to read as follows: Unga Island: East coast (1) within 2,500 feet of a point at 55 degrees 11 minutes 42 seconds north latitude, 160 degrees 27 minutes 38 seconds west longitude, and (2) within 2,500 feet of a point at 55 degrees 13 minutes 29 seconds north latitude, 160 degrees 29 minutes 37 seconds west longitude.

#### KODIAK AREA

*Salmon fishery.*—1. Regulation no. 19 (n) is amended to read as follows: Russian Harbor, southern coast of Kodiak Island: All waters within 1 statute mile of the mouth of the salmon stream in the harbor.

2. Commercial fishing for salmon between Cape Kiavak and Cape Trinity, including all waters of the adjacent islands between those capes and all waters of the Trinity Islands, except by set or anchored gill nets, is prohibited.

#### SOUTHEASTERN ALASKA AREA

##### NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—Regulation no. 6 in supplement No. 251-19-3 is amended to read as follows: Kasaan Bay, east coast of Prince of Wales Island: Within 1 statute mile of the mouth of any salmon stream in Karta Bay.

#### SOUTHEASTERN ALASKA AREA

*Herring fishery.*—Regulation no. 8 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

[May 17, 1933]

#### ALASKA PENINSULA AREA

*Salmon fishery.*—1. Regulation no. 16 is amended to read as follows: Commercial fishing for salmon along the mainland shore on the south side of Alaska Peninsula from a point on the west side of the entrance to Sankin Bay at 54 degrees 49 minutes 9 seconds north latitude, 163 degrees 18 minutes 6 seconds west longitude, easterly to Morgan Point is prohibited prior to July 15, in each year: *Provided*, That this prohibition shall not apply to the waters of Morzhovoi Bay west of 163 degrees 1 minute 45 seconds west longitude after 6 o'clock antemeridian June 1 in each year.

2. Regulation no. 23 (c) permitting the operation of a trap on Unimak Island within 2,500 feet of a point in East Anchor Cove at 54 degrees 41 minutes 12 seconds north latitude, 163 degrees 3 minutes 36 seconds west longitude, is revoked.



3. Regulation no. 23 (g) permitting the operation of a trap on Korovin Island within 2,500 feet of a point at 55 degrees 25 minutes 18 seconds north latitude, 160 degrees 9 minutes 25 seconds west longitude, is revoked.

*Herring fishery.*—Regulation no. 3 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

#### ALEUTIAN ISLANDS AREA

*Herring fishery.*—Regulation no. 2 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

#### CHIGNIK AREA

*Salmon fishery.*—Regulation no. 4 is amended to read as follows: Set or anchored gill nets shall be operated in substantially a straight line: *Provided*, That not to exceed 12 feet of each net may be used as a hook. Only one such hook is permitted on a net.

*Herring fishery.*—Regulation no. 3 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

#### KODIAK AREA

*Salmon fishery.*—Regulation no. 18 (g) permitting the operation of a trap on Kodiak Island within 2,500 feet of a point at 57 degrees 57 minutes 46 seconds north latitude, 153 degrees 9 minutes 37 seconds west longitude, is revoked.

*Herring fishery.*—Regulation no. 1 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited during the period from January 1 to June 14, both dates inclusive.

#### PRINCE WILLIAM SOUND AREA

*Herring fishery.*—1. Regulation no. 1 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from January 1 to June 14, both dates inclusive, and from November 16 to December 31, both dates inclusive: *Provided*, That this prohibition shall not apply to the use of set and drift gill nets of mesh not smaller than 2½ inches stretched measure between knots in the period from November 16 to December 15, both dates inclusive.

2. Regulation no. 2 is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock antemeridian of Saturday of each week until 6 o'clock postmeridian of the Sunday following.

#### COPPER RIVER AREA

*Salmon fishery.*—Regulation no. 7 is amended to read as follows: Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat or in use by such boat, shall not exceed 200 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian May 15 to 6 o'clock postmeridian May 31 any gill-net boat in the Copper River area may carry and operate not to exceed 100 fathoms of net of mesh not less than 8½ inches stretched measure between knots in addition to 200 fathoms of smaller mesh net.

#### BERING RIVER AREA

*Salmon fishery.*—Regulation no. 7 in supplement no. 251-19-4, issued March 7, 1933, is amended to read as follows: Prior to 6 o'clock antemeridian August 10 in each calendar year the total aggregate length of drift gill nets on any salmon fishing boat, or in use by such boat, shall not exceed 200 fathoms hung measure: *Provided*, That during the period from 6 o'clock antemeridian June 1 to 6 o'clock postmeridian June 15 any gill-net boat in the Bering River area may carry and operate not to exceed 100 fathoms of net of mesh not less than 8½ inches stretched measure between knots in addition to 200 fathoms of smaller mesh net.

## SOUTHEASTERN ALASKA AREA

## EASTERN DISTRICT

*Salmon fishery.*—Regulation no. 16 (a) permitting the operation of a trap on Shelter Island within 2,000 feet of a point at 58 degrees 27 minutes 4 seconds north latitude, 134 degrees 54 minutes west longitude, is revoked.

## NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—Regulation no. 16 is amended to read as follows: All commercial fishing for salmon is prohibited within 500 yards of the mouth of any salmon stream in Wrangell Narrows between Point Alexander and Prolewy Point.

## SOUTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 1 in supplement no. 251-19-2, issued February 28, 1933, is amended to read as follows: Long Island, east of Dall Island: East and west coasts within 2,500 feet measured along the coast from 54 degrees 46 minutes 15 seconds north latitude.

2. Regulation no. 2 in supplement no. 251-19-2, issued February 28, 1933, permitting the operation of traps within 2,500 feet of a point on an unnamed island at 54 degrees 45 minutes 33 seconds north latitude, 132 degrees 22 minutes 17 seconds west longitude, and within 2,500 feet of the northwestern extremity of an unnamed island at 54 degrees 43 minutes 9 seconds north latitude, 132 degrees 19 minutes 17 seconds west longitude, is revoked.

## SOUTHEASTERN ALASKA AREA

*Herring fishery.*—Regulation no. 9 providing for a weekly closed period of 48 hours in certain waters of Chatham Strait and along the western coast of Baranof Island is revoked.

[June 3, 1933]

## ALASKA PENINSULA AREA

*Salmon fishery.*—Regulation no. 23 (p) is amended to read as follows: Korovin Island: Southeast coast within 5,200 feet easterly and northerly from a point at 55 degrees 22 minutes 45 seconds north latitude, 160 degrees 9 minutes 21 seconds west longitude.

## COPPER RIVER AREA

*Salmon fishery.*—Regulation no. 3 providing for a 12-hour weekly closed period from May 15 to July 5, in addition to the 36-hour weekly closed period prescribed by section 5 of the act of June 6, 1924, is hereby revoked.

## BERING RIVER AREA

*Salmon fishery.*—Regulation no. 3 in supplement no. 251-19-4 issued March 7, 1933, providing for a 12-hour weekly closed period from June 1 to July 5, in addition to the 36-hour weekly closed period prescribed by section 5 of the act of June 6, 1924, is hereby revoked.

[June 26, 1933]

## COOK INLET AREA

*Salmon fishery.*—Regulation no. 1 is hereby amended so that commercial fishing for salmon in Chinik Inlet, Kamishak Bay, may begin at 6 o'clock antemeridian June 27.

[June 27, 1933]

## KODIAK AREA

*Salmon fishery.*—1. Regulation no. 1 is amended to read as follows: The use of any floating trap for the capture of salmon is prohibited.

2. Commercial fishing for salmon by means of any purse seine more than 125 fathoms in length is prohibited.

3. Regulation no. 5 is amended so as to permit the use of not to exceed 50 yards of each set or anchored gill net as a hook.

4. Regulation no. 8 is amended so as to permit the use of purse seines within a line from Cape Trinity to Cape Alitak.

5. Regulation no. 12 is amended so as to permit the use of purse seines between Cape Karluk and Cape Uyak, and between Cape Uyak and Uyak post office.

6. Regulation no. 15 is amended so as to permit the use of purse seines on the north coast of Kodiak Island from Cape Karluk to Cape Uyak in the period from August 15 to August 31, both dates inclusive.

[July 7, 1933]

#### BRISTOL BAY AREA

*Salmon fishery.*—1. In addition to existing prohibitions, commercial fishing for salmon in the Nushagak district, which embraces the waters of Nushagak Bay within a line from Point Protection to Etolin Point, is prohibited on Saturday of each week from 3:30 o'clock postmeridian to 6 o'clock postmeridian, in the period prior to 6 o'clock antemeridian August 3.

2. In addition to existing prohibitions, commercial fishing for salmon in the Ugashik district, which includes the coastal waters from a point 3 statute miles north of Cape Greig to a point on the coast 3 statute miles south of Cape Menshikof, is prohibited from 6 o'clock antemeridian Monday to 2 o'clock antemeridian Tuesday of each week, in the period prior to 6 o'clock antemeridian August 3.

[July 10, 1933]

#### ALASKA PENINSULA AREA

*Salmon fishery.*—Regulation no. 2 in supplement no. 251-19-7, issued May 17, 1933, prohibiting the operation of a trap within 2,500 feet of a point in East Anchor Cove at 54 degrees 41 minutes 12 seconds north latitude, 163 degrees 3 minutes 36 seconds west longitude, is hereby revoked effective at noon on July 10.

[July 12, 1933]

#### ALEUTIAN ISLANDS AREA

*Herring fishery.*—Regulation no. 1 in supplement no. 251-19-7, issued May 17, 1933, is amended to read as follows: Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock postmeridian of Saturday of each week until 6 o'clock antemeridian of the Monday following.

#### ALASKA PENINSULA AREA

*Salmon fishery.*—Regulation no. 7 is amended to read as follows: No stake gill net nor set or anchored gill net shall exceed 25 fathoms in length measured on the cork line, except that in the waters of the Shumagin Islands gill nets not to exceed 75 fathoms in length may be used.

[July 19, 1933]

#### SOUTHEASTERN ALASKA AREA

##### WESTERN DISTRICT

*Salmon fishery.*—Regulation no. 3 in supplement no. 251-19-5, issued March 23, 1933, is amended, effective at 6 o'clock antemeridian July 21, 1933, to read as follows: Commercial fishing for salmon in Chilkat Inlet is prohibited north of a line from Green Point passing across the southern shore of Pyramid Island to the northern shore of Chilkat Inlet.

#### ICY STRAIT, WESTERN, EASTERN, SOUTH PRINCE OF WALES ISLAND, AND SOUTHERN DISTRICTS

*Salmon fishery.*—The regulations prohibiting commercial fishing for salmon by trolling from 6 o'clock antemeridian August 25 to 6 o'clock postmeridian September 20 are hereby revoked.

[July 21, 1933]

## SOUTHEASTERN ALASKA AREA

## NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—In addition to existing prohibitions, commercial fishing for salmon, except by trolling, is prohibited in all waters of Fools Inlet and Bradfield Canal east of a line extending from Point Warde cannery bluff to the point at the west side of the entrance to Fools Inlet in the period from 6 o'clock antemeridian July 21 to 6 o'clock postmeridian July 26.

[July 25, 1933]

## PRINCE WILLIAM SOUND AREA

*Salmon fishery.*—In addition to existing prohibitions, all commercial fishing for salmon is prohibited in that part of Prince William Sound north of 60 degrees 37 minutes north latitude and west of 148 degrees west longitude after 12 o'clock midnight of July 27.

[July 31, 1933]

## COOK INLET AREA

*Salmon fishery.*—Regulation no. 1 is amended so as to permit commercial fishing for salmon north of 60 degrees 50 minutes north latitude until 6 o'clock postmeridian August 4.

## PRINCE WILLIAM SOUND AREA

*Salmon fishery.*—Regulation no. 10 is amended so as to permit (1) commercial fishing for salmon until 6 o'clock postmeridian August 4 except in the waters north of 60 degrees 37 minutes north latitude and west of 148 degrees west longitude where all commercial fishing for salmon is prohibited; (2) trolling and gill netting through August 22 in the waters along the western coast from the outer point on the north shore of Granite Bay (known as Granite Bay Point) to the light on the south shore of the entrance to Port Nellie Juan; and (3) the operation of set or anchored gill nets in the period from 6 o'clock antemeridian August 2 to 6 o'clock postmeridian September 20 in the waters of Valdez Arm east of 146 degrees 25 minutes west longitude. All trap leads from shore to entrance of hearts must be removed prior to 6 o'clock antemeridian August 9.

## SOUTHEASTERN ALASKA AREA

## ICY STRAIT DISTRICT

*Salmon fishery.*—Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 6.

[August 2, 1933]

## SOUTHEASTERN ALASKA AREA

## NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—Regulation no. 18 (*p*) prohibiting all commercial fishing for salmon in Olive Cove, indenting the northeastern shore of Etolin Island, is hereby revoked.

[August 5, 1933]

## SOUTHEASTERN ALASKA AREA

## ICY STRAIT DISTRICT

*Salmon fishery.*—Regulation no. 1 in supplement no. 251-19-17, issued July 31, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 10.

[August 9, 1933]

## SOUTHEASTERN ALASKA AREA

## WESTERN DISTRICT

*Salmon fishery.*—1. Regulations nos. 6 and 7 are amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 19.

2. Regulation no. 9 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 19.

## NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—In addition to existing prohibitions, commercial fishing for salmon, except by trolling, is prohibited in all waters of Fools Inlet and Bradfield Canal east of a line extending from Point Warde cannery bluff to the point at the west side of the entrance to Fools Inlet.

[August 10, 1933]

## KODIAK AREA

*Salmon fishery.*—Regulation no. 15 is amended so as to permit commercial fishing for salmon in Alitak Bay and all its branches until 6 o'clock postmeridian August 25, and from 6 o'clock antemeridian September 5 through September 30. All commercial fishing for salmon in Alitak Bay and all its branches is prohibited from 6 o'clock postmeridian August 25 to 6 o'clock antemeridian September 5.

[August 15, 1933]

## SOUTHEASTERN ALASKA AREA

## EASTERN DISTRICT

*Salmon fishery.*—1. Regulation no. 7 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 19.

2. Regulation no. 9 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 19.

[August 17, 1933]

## SOUTHEASTERN ALASKA AREA

## SOUTHERN DISTRICT

*Salmon fishery.*—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 22.

2. Regulation no. 8 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 22.

[August 21, 1933]

## SOUTHEASTERN ALASKA AREA

## WESTERN DISTRICT

*Salmon fishery.*—1. Regulations nos. 6 and 7, as modified by supplement no. 251-19-20, issued August 9, 1933, are amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 22.

2. Regulation no. 9, as modified by supplement no. 251-19-20, issued August 9, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 22.

## EASTERN DISTRICT

*Salmon fishery.*—1. Regulation no. 7, as modified by supplement no. 251-19-22, issued August 15, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 23, and to permit commercial fishing for salmon by means of drift gill nets in Taku Inlet from 6 o'clock antemeridian September 5 to 6 o'clock postmeridian September 30.

2. Regulation no. 9, as modified by supplement no. 251-19-22, issued August 15, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 23.

#### ALL AREAS

*Herring fishery.*—The dumping of offal and dead herring in the waters of any bay in which herring spawn is prohibited.

[August 22, 1933]

#### SOUTHEASTERN ALASKA AREA

##### NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 26.

2. Regulation no. 7 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 26.

[August 26, 1933]

#### CHIGNIK AREA

*Salmon fishery.*—Regulation no. 12 is amended so as to prohibit all commercial fishing for salmon after 6 o'clock postmeridian August 26.

#### SOUTHEASTERN ALASKA AREA

##### NORTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 6, as modified by supplement no. 251-19-25, issued August 22, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 29.

2. Regulation no. 7, as modified by supplement no. 251-19-25, issued August 22, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 29.

##### SOUTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 6 is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian August 31.

2. Regulation no. 8 is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian August 31.

[August 31, 1933]

#### SOUTHEASTERN ALASKA AREA

##### SOUTH PRINCE OF WALES ISLAND DISTRICT

*Salmon fishery.*—1. Regulation no. 6, as modified by supplement no. 251-19-26, issued August 26, 1933, is amended so as to permit commercial fishing for salmon until 6 o'clock postmeridian September 2.

2. Regulation no. 8, as modified by supplement no. 251-19-26, issued August 26, 1933, is amended so as to permit commercial fishing for salmon by means of traps until 6 o'clock postmeridian September 2.

Revised regulations covering the fisheries of Alaska were issued by the Secretary of Commerce under date of December 21, 1933, copies of which may be secured, without cost, on application to the Bureau of Fisheries, Washington, D.C.

#### ANNETTE ISLAND FISHERY RESERVE

The lease of the fishing and canning privileges of the Annette Island Fishery Reserve by the Annette Island Packing Co. under contract dated February 25, 1928, expired on December 1, 1932, and the cannery was again offered to competitive bidders.

On April 4, 1933, the First Assistant Secretary of the Interior on behalf of the inhabitants of the reserve entered into a contract, effective on that date, with W. A. Pries, of Ketchikan, for the lease of the cannery for 5 years. Under the terms of this contract the lessee operates the cannery in consideration of one-half of the net profits, with a guarantee of a minimum annual payment of \$3,000 to the lessor, regardless of the amount of profits made, and with the further provision that all net profits in excess of \$25,000 for 1 year shall be prorated upon the basis of 55 percent to the lessor and 45 percent to the lessee.

In accordance with a provision of the contract, Mr. Pries organized a corporation, known as the Annette Island Canning Co., for the purpose of carrying out the terms of the agreement.

In 1933 the company operated 6 traps within the reservation, the catch of which totaled 552,192 salmon, and 10,271 salmon taken in purse seines and gill nets were purchased from the natives. In addition, 556,483 salmon were purchased from independent operators of traps and seines outside the reserve and packed at the cannery. In the operation of the cannery and of the fish traps employment was given to 25 whites, 154 natives, and 1 Filipino.

#### STREAM IMPROVEMENT

As in previous years, Bureau employees in the course of their regular patrol duties removed log jams and other obstructions in salmon streams from time to time, in order to enable the salmon to reach the spawning beds. Attention was given also to the destruction of predatory trout, particularly in the Bristol Bay and Kodiak Island regions. The work of stream improvement in general, however, was greatly curtailed this season, as the field force was small because of the limitation of funds.

An appropriation of \$15,000 was made by the Territorial Legislature in 1933 to be expended during the next biennium for the destruction of predatory enemies of salmon, which has enabled a more active prosecution of this work in the winter of 1933-34.

#### STREAM MARKING

New markers defining areas closed to commercial fishing were erected to replace those which had become illegible or damaged, and changes were made in the positions of others to conform with changes made in the regulations with respect to closed areas.

#### STREAM GUARDS

The Bureau employed 131 men in 1933 as stream guards and special workmen in connection with law-enforcement duties. Of these, 56 were stationed in southeastern Alaska, 50 in central, and 25 in western Alaska. Not only was the number of persons employed considerably less than in previous years, but the period of employment was greatly curtailed, the average for all temporary workers being less than 2 months.

In southeastern Alaska 22 stream watchmen furnished their own launches and were assigned to patrol larger bodies of water or in the vicinity of several streams.

In central Alaska 21 guards were stationed in the Seward-Katalla district, 8 on Cook Inlet, 14 in the Kodiak-Afognak district, 2 at Chignik, and 5 in the Ikatan-Shumagin district. Twenty of these guards, most of whom were in the Seward-Katalla district, provided their own launches.

In western Alaska 23 were on Bristol Bay and 2 in the Yukon-Kuskokwim district.

There were also 5 special employees engaged in scientific work—2 on herring and 3 on salmon investigations, this work being carried on in southeastern and central Alaska.

In addition there were 12 statutory employees, 53 men on the Bureau's vessels, and 2 on the 2 chartered boats.

The foregoing makes a grand total of 203 persons identified with fishery-protective work in Alaska in 1933, as compared with 290 in 1932.

#### VESSEL PATROL

Fourteen vessels owned by the Bureau were engaged in fishery-patrol work in Alaska in 1933. Of these the *Widgeon*, *Murre*, *Auklet*, and *Petrel* were used in southeast Alaska; the *Kittiwake* in the Seward-Katalla district; the *Blue Wing* and *Red Wing* in the Kodiak-Afognak area; the *Ibis* at Chignik; the *Scoter* on Bristol Bay; and the *Coot* on the Yukon River. The *Eider* and *Crane* patrolled the Alaska Peninsula area, and both assisted in the transportation of Bureau employees and supplies between Seattle and Bristol Bay. The *Crane* also participated in the fishery patrol and stream inspection in southeast Alaska during the fall season. The *Teal* was again on duty at Cook Inlet until the middle of August and later assisted with the patrol in southeast Alaska.

The *Brant* was used chiefly in general supervisory work, visiting all fishing areas as far westward as Bristol Bay in June and July. During the remainder of the season it cruised in southeast Alaska, assisting with the patrol and stream survey work. The *Puffin*, which had been on patrol duty in the vicinity of Ketchikan in 1932, was laid up at Seattle throughout the year.

Three speed boats, each equipped with an 82-horsepower Chrysler motor, were built by the Bureau in the spring of 1933 and were used in the fisheries patrol in Alaska during the season—1 at Yakutat, 1 on Copper River and Prince William Sound, and 1 in Bristol Bay. Five other small patrol boats were also operated by the Bureau in the Bristol Bay area.

In addition to the vessels owned by the Bureau of Fisheries, two vessels were chartered for patrolling fishing areas—the *Sterling* in the Ketchikan region, and the *Katherine L* on Copper River and Prince William Sound. A chartered launch, the *Marie S*, was used on the Kuskokwim River.

#### COMPLAINTS AND PROSECUTIONS

In southeastern Alaska a floating trap of the Independent Salmon Canneries, Inc., was seized on July 23 for fishing during the weekly closed period. When the case was brought before the United States Commissioner's Court at Juneau, the agent of the company pleaded guilty to illegal fishing, and a fine of \$100 was assessed. Upon payment of the fine and costs, the trap was released.



A floating trap of the Alaska Pacific Salmon Corporation was seized for not having the tunnel properly closed and the spillers raised to within 4 feet of the surface during the closed period before the beginning of the salmon fishing season. Condemnation proceedings were filed at the Commissioner's Court at Juneau, but on recommendation of the United States attorney they were dismissed.

Five seine boats in southeastern Alaska, the *John Quenette*, *Teaser*, *Bernice*, *Collette*, and *Cedrie*, were seized for illegal fishing in closed waters. Pleas of guilty were entered by the defendants in each case, and fines were imposed, ranging from \$50 to \$375 for the several boats and aggregating \$1,250, exclusive of costs. The operator of the gas boat *Norma Jane* was fined \$75 and costs of \$29.75 for using a beach seine in Smeaton Bay, in which locality this type of gear is prohibited.

In the Seward-Katalla district a trap belonging to William King and W. J. Crooker was seized because it was not constructed so as to prevent the capture of salmon during the closed period, and the defendants paid a fine of \$200. In this area, also, a fisherman was fined \$25, including costs, for taking undersized razor clams, and another was given a 20-day suspended sentence for using an anchored gill net in the Copper River region, where only drift gill nets are permitted. The clams and salmon illegally taken were confiscated and sold, the proceeds being turned over to the Department of Justice.

A 78-fathom gill net, of which 15 fathoms were used as a hook, was operated by Harry W. Crosby off the shore of Chignik Island in violation of the regulation which limited the length of anchored gill nets in this area to 25 fathoms, of which not more than 12 fathoms might be used as a hook. The net and a skiff were seized, and the salmon were confiscated and sold for the account of the Government. At the close of the year the case was still pending.

Two gill-net boats of the Alaska Packers Association were found violating the regulations in the Bristol Bay area, the *R-49* off the Naknek River with net in the water a half-hour after the beginning of a weekly closed period, and boat *No. 38* above the markers in upper Kvichak Bay. Hearings were held before the local commissioner and in view of extenuating circumstances the men, boats, and gear were released.

#### TERRITORIAL FISHERY LEGISLATION

At its biennial session in 1933 the Legislature of Alaska passed 6 acts which have reference to the fisheries of the Territory.

Appropriations for the payment of bounty on hair seals, which are destructive to salmon and other fishes in certain localities, were made in 2 acts, 1 of which included also an appropriation of \$15,000 for the improvement of salmon spawning streams and the destruction of predatory enemies of salmon.

An act was passed repealing chapter 95 of the laws of 1923, which provided for closed seasons on salmon fishing in southeast Alaska in addition to the restrictions imposed by regulations of the Department of Commerce.

The law of 1927 relative to a tax of one-tenth of 1 cent per pound on fresh fish purchased by fish dealers was amended to make the tax applicable only to such fish purchased in excess of 400,000 pounds.

An act was passed to amend and codify the laws of the Territory providing for liens of cannery and saltery workers and fishermen.

An act approved April 20, 1933, repealed legislation of 1923, 1925, and 1929 with respect to the licensing of fishermen, and made operative license fees of \$1 for each resident fisherman and \$25 for each nonresident fisherman. The validity of this act has been questioned, and pending the court's final decision in the case nonresident fishermen have been paying the fee under protest in order that they may recover if the law is held invalid.

### TERRITORIAL LICENSE TAX

Fisheries license taxes were collected by the Territory under the General Revenue Law of 1921, as amended in subsequent sessions of the Territorial Legislature. A statement from W. G. Smith, Territorial treasurer, under date of May 11, 1934, gives the collections made to that date for the year 1933. It was stated that collections under the several schedules were fairly complete, although a number of the fisheries companies had not yet made full settlement. The outstanding salmon pack taxes amounted to approximately \$50,000 and about \$5,000 was still due on fish traps, while \$4,400 was still to be collected on fish oil and fertilizer, and \$3,300 under the whale oil and fertilizer schedule.

#### *Fishery license taxes collected by Territory for fiscal year ended Dec. 31, 1933*

Schedule	Division no. 1	Division no. 2	Division no. 3	Total
Salmon canneries (pack) .....	\$83, 188. 65	-----	\$453, 996. 71	\$537, 185. 36
Clam canneries .....	-----	-----	394. 71	394. 71
Salteries .....	2, 314. 09	\$73. 89	2, 630. 99	5, 018. 97
Cold-storage plants .....	700. 00	-----	-----	700. 00
Fish-oil works and fertilizer and fish-meal plants .....	20, 739. 11	-----	4, 559. 87	25, 298. 98
Fish traps .....	68, 969. 19	-----	45, 323. 74	114, 292. 93
Gill nets .....	340. 50	23. 00	3, 793. 00	4, 156. 50
Seines .....	3, 010. 00	-----	1, 840. 00	4, 850. 00
Total .....	179, 261. 54	96. 89	512, 539. 02	691, 897. 45
Salmon canneries (net income), not possible of segregation as to judicial division .....	-----	-----	-----	12, 874. 35
Total collections .....	-----	-----	-----	704, 771. 80

### WATER-POWER PROJECTS IN ALASKA

An application for a license for a minor power project at New Port Walter on the east side of Baranof Island was referred to the Bureau by the Federal Power Commission for report as to whether any special conditions for the protection of migratory fish should be imposed in the license, if issued. As the stream in question is not used by spawning salmon, the Commission was notified that no such special conditions would be necessary.

The Federal Power Commission also asked for a report of the effect on fish migration of the existing and former structures constituting a part of the power project constructed by the Kasaan Gold Co. on Harris Creek, a tributary of Kasaan Bay, and requested recommendations for such conditions as should be imposed on the

licensee in the event that the project should be rebuilt. The Commission was advised that the Bureau's field agent at Ketchikan reported that the creek was not obstructed by the dam of the Kasaan Gold Co. in its present state of disrepair. Recommendation was made that if the project were rehabilitated the company be required to install a fish ladder at a specified place in order that a constant flow of water might be assured.

#### KUSKOKWIM RIVER

From June 4 to July 29 Stream Guard Charles McGonagall patrolled the Kuskokwim River area, using a chartered launch. During that time no heavy runs of salmon were observed, and there were no large catches. The best catches were made with drift nets at night. There was no rain in June and July and the river was clear, which undoubtedly accounted for the fact that few fish were taken in gill nets and fish wheels. No fishing for export was carried on in this district in 1933. Two hundred and eighty-six natives fished in the river for local requirements, using 509 gill nets of 7,630 fathoms, 38 wheels, and a number of small boats. They prepared 282 tons of dried chums.

#### YUKON RIVER

Two operators engaged in commercial fishing in the Yukon River area in 1933, their products for the outside market amounting to 132 tierces of mild-cured kings and 72 barrels of pickled kings.

A patrol of the district was again maintained by Inspector C. F. Townsend and a stream guard with the *Coot*, which left the Government ways at Nenana on May 23 for the mouth of the Yukon. The river was then at a very low stage for the time of year, no doubt because the snowfall in the interior of Alaska had been light during the winter. The ice was late in breaking up, and it was necessary for the vessel to wait some time at Shageluk Slough for the river to clear. Hamilton was reached on June 3.

Ice was piled up off the different mouths of the river until June 16, and the salmon runs were unusually late in arriving. The first king salmon, badly bruised and cut by the ice, were caught on June 14. The big run started 3 days later and continued through the month. The run of chums started on June 20. Catches were heavy in the lower river reaches, but above Mountain Village they were the lightest for years, due no doubt to the low stage of the river throughout June and July. Reports indicate that the September run was fair. Also a good supply of dried dog feed had been carried over from the previous season, thus avoiding any shortage for the needs of the district during the winter.

Products of the Yukon and Tanana fisheries, including the commercial output, were as follows: 138 cases of kings canned and 528 pounds of canned smoked kings, 132 tierces of mild-cured kings, 19,400 pounds of kings and 2,400 pounds of chums pickled, and 392 tons of dried chums. Apparatus consisted of 242 wheels, 130 gill nets of 1,668 fathoms, 1 motor vessel of 50 tons, 3 launches, 1 scow, and miscellaneous small boats. There were 13 whites and 344 natives engaged in the fishery.

## WEIRS FOR COUNTING SALMON ESCAPEMENT

A lack of funds prevented the operation in 1933 of many of the weirs previously established for counting the escapement of spawning fish in typical salmon streams of Alaska as a means of determining the ratio of escapement to catch. The weirs at Karluk, Chignik, and Olive Cove, however, were again operated in order that further data might be obtained in regard to the runs in these localities, where the Bureau has for a number of years specialized in scientific studies of the life history and habits of the salmon. One weir was continued also in Cook Inlet, and in the Alitak Bay district a count was made at the cannery station during part of the season.

Reports of operations of the weirs and of the counts of salmon in 1933 are as follows:

## OLIVE COVE

Construction of the Olive Cove weir and of a special inclosure to hold fish for scientific study was begun on June 7 and completed on June 12. Pink salmon began to appear at the mouth of the creek on July 6, and on July 12 a few were below the first falls. The first count was on July 15, and the peak of the run occurred on July 21, on which date 13,527 pink salmon passed through the weir. Counting was continued to August 24, when the total escapement numbered 133,081 pink salmon, 107 chums, and 51 cohos. It was estimated that approximately 7,000 spawning fish were in the stream below the weir at the time the structure was removed. Walter Campen was in charge of the work at this place, under the supervision of Assistant Agent S. A. Baker.

## KARLUK RIVER

The Karluk weir was completed on May 14, and the first count was made on May 16, when a few king salmon passed upstream. Red salmon began to appear on May 21, but it was not until June 2 that any appreciable numbers were tallied. Although the weir count to June 1 was small, there were large numbers of salmon in the closed waters of the lagoon ready to ascend to the spawning beds; therefore, the opening of the fishing season was not postponed until a later date. Good catches were made throughout June, with the result that the total catch exceeded the weir escapement; therefore, the Karluk area was closed from 6 o'clock postmeridian July 1 until 6 o'clock antemeridian July 10. The reopening of the district to commercial fishing on the latter date was in order that the fishermen might take advantage of the increasing run of pink salmon. It became necessary, however, to close the section between Cape Karluk and Cape Uyak on July 29 and the entire Karluk area on August 19, and the only additional fishing permitted during the season was for the week from September 11 to 16.

The total count of salmon through the weir from May 16 to October 9, inclusive, was 986,765 reds, 107,663 pinks, 12,824 cohos, and 8,107 kings. The reported commercial catch of red salmon from Cape Karluk to West Point was 842,733, indicating that 46 percent of the Karluk run was caught and 54 percent escaped to the spawning grounds.

Before the seaward migration of young red salmon began in the spring a considerable number of predatory trout were caught by traps and seines. Forty thousand red-salmon fingerlings were marked at Karluk Lake in May and June.

Charles P. Turner was in charge of this weir, under the direction of Warden Howard H. Hungerford.

#### CHIGNIK RIVER

The site of the Chignik weir was approximately 30 feet below that used in the previous year, where the river is about 455 feet wide and from 2 to 4½ feet deep. Construction began on April 25 and was completed on May 25. The first salmon passed upstream on June 6, and counting was continued through June 24, when 104,565 red salmon had been tallied. As a result of heavy rains which began on June 20, the river rose rapidly and the gravel at the bottom was washed away, causing the weir to sag and finally, on the morning of June 25, to break down so that the salmon could pass through. By July 17 the river had dropped 1 foot, and an attempt was then made to repair the weir, but it was unsuccessful.

The run of red salmon, which reached its peak during the week ending July 1, was light throughout the season. The reported catch of reds was 541,678, and it was estimated that 534,660 escaped to the spawning grounds. The run of chum salmon was the largest since 1929, the pink salmon run was good for an off year, and the coho run was fair. Warden Charles Petry was in charge of the Bureau's work at this place.

#### CHINIK CREEK

A weir was placed in Chinik Creek, Kamishak Bay, on the site formerly used, and from June 28 to July 25, inclusive, 39,222 red salmon were counted. Frank West, stream watchman in the district, performed the weir work under the direction of Capt. R. L. Cole.

#### ALITAK BAY

The cannery station weir on Olga Bay, in the Alitak Bay region, was installed for the purpose of catching predatory trout in the spring and was operated for a number of weeks thereafter in counting the salmon escapement. From May 23 to August 26 there were counted 90,448 red salmon. As this stream normally receives about 25 percent of the run into Olga Bay, it is estimated that at least 300,000 red salmon entered the Olga Bay tributaries. The total reported catch of red salmon in the district was 168,540.

Henry B. Loeff conducted operations here under the supervision of Warden Howard H. Hungerford.

#### SALMON LIFE-HISTORY STUDIES

Studies of the biology of the Alaska salmon were continued in 1933 by the staff of investigators of the Fisheries Biological Station at Seattle, Wash. Two major investigations dealing with the red salmon, at Karluk and Chignik, and one pertaining to the pink salmon in southeastern Alaska were in progress during the year.

The principal objective of the red-salmon investigations is to determine the number of fish that should be permitted to spawn in order to produce the greatest surplus for the commercial fishery in succeeding generations. To further this study additional marking experiments were undertaken in which small seaward migrating salmon were marked for future identification by removal of certain fins. The investigation at Karluk was directed by Joseph T. Barnaby, and that at Chignik by Harlan B. Holmes.

Under the direction of Dr. Frederick A. Davidson, racial characteristics of pink salmon have been studied in southeastern Alaska for a period of 4 years, or two life cycles of this species. Preliminary analysis of the data collected points to racially distinct populations in each stream, and to distinct populations in the same stream in odd and even years. In addition to this primary phase of the pink salmon investigation, studies of the seasonal change in the quality of pink salmon have been undertaken in cooperation with the National Cannery Association. Complete reports of these investigations are published in another document.

#### OBSERVATIONS ON THE ESCAPEMENT OF SALMON

Field employees kept in close touch with the progress of the salmon runs throughout the season in all districts for the purpose of regulating commercial fishing operations. At the close of the fishing season some of the representative salmon streams were visited to observe conditions on the spawning beds.

*Southeast Alaska.*—Throughout all southeastern Alaska the runs of pink salmon were late, and the fish were of small size. In the north Prince of Wales Island and southern districts the catch of this species was negligible prior to July 15, but after that date and until the end of the season the runs increased and some good catches were made. There was little escapement of pink salmon in the southern district until after the close of commercial fishing, and the late runs resulted only in irregular seeding of the spawning beds. Some streams appeared to be adequately seeded, while others received so few spawning fish as to endanger the runs. In the north Prince of Wales Island district the escapement was more satisfactory, although not as large as in other recent years. The escapement in this district was regarded as fair.

The pink salmon runs in all parts of the south Prince of Wales Island district were smaller than they have been for several years. They improved somewhat toward the end of the season and provided an adequate supply of spawning fish in a number of streams, but, as in the north Prince of Wales Island and southern districts, the escapement was very irregular, and streams tributary to Sea Otter Sound and Tuxekan Passage were found to have less than half of the normal seeding. Conditions in the streams of this district were particularly favorable this year, and it seems probable that a good return may result from this comparatively poor escapement. The red salmon run in this district was comparable to that of the two previous years, in which satisfactory increases had been noted. The chum and coho runs were also satisfactory.

In the Icy Strait, western and eastern districts the pink salmon did not appear in numbers until much later than usual. In the Icy

Strait district this species appeared late in June, in the western district about July 20, and in the eastern district about August 5. These runs appeared to be numerically as strong as in 1932, but the individuals were of very small size. The pink salmon escapement in these districts was below normal. The runs of reds and chums were smaller than usual, and the escapement of these species was correspondingly light.

In the Yakutat district the runs of all species were generally below average. The escapements of reds to Lost River, Situk River, Ahrnklin River, and Italio River were good, and fair escapements of other species were obtained.

*Prince William Sound and Copper River region.*—The pink salmon runs in Prince William Sound were smaller than usual and because of the exceptionally dry weather and lack of water in the streams very few fish reached the spawning grounds prior to the close of commercial operations. From an inspection of some of the streams in this region it was concluded that the spawning gravels were fairly well seeded except in the streams along the northwestern coast, including Port Wells. There was a good escapement of red salmon to Eshamy River, and also to Eyak and Copper Rivers, but the runs of this species to Bering River were a failure. The escapement of cohos was believed to be satisfactory.

*Cook Inlet.*—The escapement of red salmon was very large in the more important spawning grounds of Cook Inlet. Large numbers were observed especially in the Kenai and Kasilof River systems, and on the Fish Creek gravels. Inadequate escapements were reported for Cottonwood Creek and English Bay and Kalgin Island streams. The escapements into Chinik Creek and Susitna River were considered satisfactory. The run of pink salmon was not large, but was of sufficient size to adequately seed the streams of this region as few of the fish were taken for commercial purposes.

*Kodiak area.*—Pink salmon were abundant in all streams of this region except those in Alitak Bay where the run was unusually light. The red salmon runs were good in the early part of the summer but were of short duration. The escapement of this species was below average throughout the district, and especially in Karluk River, where the run was small. The run of chum salmon was much below normal and resulted in a proportionately small escapement. The coho run was about two weeks later than usual but a good escapement was obtained.

*Chignik.*—The red salmon run and escapement at Chignik was one of the poorest on record, the total run being estimated at slightly more than a million fish. Of this number it was estimated that about 535,000 were reserved for spawning purposes. Most of the streams in the Chignik region had a fair escapement of other species.

*Alaska Peninsula.*—A good escapement of pinks and chums occurred in practically all streams on the south side of the Alaska Peninsula. Particularly good escapements of these species were noted in streams tributary to Ikatan and Morzhovoi Bays. In general, the escapement of red salmon was below normal, although spawning grounds in Thin Point, Mortensen, and Kinzarof Lagoons appeared to be well seeded.

*Bristol Bay.*—The red salmon run in Bristol Bay was one of the largest on record and the escapements in Kvichak, Naknek, and

Egegik Rivers were very large. Subsequent observations at Lake Iliamna and Lake Clark indicated that the fish were well distributed on the spawning grounds. The run of reds in Nushagak Bay was light and the escapement was considerably below normal. The run of this species in Ugashik River also was light, but it is believed that an escapement of approximately 50 percent of the run was obtained.

## HATCHERIES

### EXTENT OF OPERATIONS

The operation of the Government's hatcheries at Afognak and McDonald Lake was discontinued after the young salmon hatched from eggs taken in the preceding year had been liberated. At the privately owned hatchery on Hugh Smith Lake salmon propagation was carried on throughout the year. This hatchery was taken over by the Pacific American Fisheries when it leased the properties of the Northwestern Fisheries Co. in Alaska in the spring of 1933.

From the Afognak hatchery there were released in near-by lakes during the months from March to June, inclusive, 17,400,000 red-salmon fry that had been produced from the 19,151,800 eggs collected in 1932. A shipment of 154,000 eyed Dolly Varden trout eggs was forwarded from this hatchery to the Bureau at Seattle in February.

Of the 25,500,000 red-salmon eggs that were collected at the McDonald Lake hatchery in 1932, 3,010,650 in the eyed stage were shipped to Seattle in October of that year. From the remainder there were produced and liberated into Lake McDonald 2,480,000 advanced fry and 14,073,000 no. 2 fingerlings, the former being released in May and the latter in July. There were also released into Lake McDonald in March 153,900 pink-salmon fry, produced from eggs collected at this hatchery in 1932.

The private hatchery at Hugh Smith Lake produced and liberated in Alaska waters 22,173,950 red-salmon fry from the 25,895,000 eggs collected in 1932. A collection of 20,650,000 red-salmon eggs was made at this hatchery in 1933.

#### *Operations of Federal and private hatcheries in Alaska in 1933*

Location of hatchery	Red or sockeye salmon		
	Eggs taken in 1932	Salmon lib- erated in 1933	Eggs taken in 1933
Afognak.....	19, 151, 800	17, 400, 000	-----
McDonald Lake.....	25, 500, 000	16, 553, 000	-----
Hugh Smith Lake (Quadra).....	25, 895, 000	22, 173, 950	20, 650, 000
Total.....	70, 546, 800	56, 126, 950	20, 650, 000

### HATCHERY REBATES

The owners of private salmon hatcheries in Alaska who are also packers of canned salmon receive a rebate on license fees and taxes of every nature on their catch and pack of salmon at the rate of 40 cents per 1,000 king- or red-salmon fry liberated by them in Alaska.



waters. In the fiscal year ended June 30, 1933, only one such private salmon hatchery was operated—that of the Northwestern Fisheries Co. at Hugh Smith Lake—and the rebate due on the 22,173,950 red-salmon fry liberated there during the year amounted to \$8,869.

#### GENERAL STATISTICS OF THE FISHERIES

The total number of persons engaged in the fisheries of Alaska in 1933 was 21,695, or 1,573 more than in 1932. Fishery products were valued at \$32,126,588, an increase of \$7,097,668, or 28 percent over the preceding year. Of the total amount, 91.5 percent represented the value of salmon products; 4.4 percent herring; 2.3 percent halibut; and 1.8 percent the value of all other fishery products.

#### SALMON

An outstanding feature of the salmon runs in Alaska in 1933 was the unusual abundance of red salmon in the Bristol Bay region, particularly in the Kvichak-Naknek section. Although the fish were of smaller size than they are in some years, they were present in such enormous numbers that a larger pack was put up in the western district than for any previous year except 1918. Most of the packers had filled all their cans and discontinued operations before the close of the fishing season.

In the various red-salmon regions of central Alaska the runs in general were fair, while in southeast Alaska the number of red salmon was considerably below average. The runs of the other species of salmon throughout the Territory as a whole were about normal.

The total catch of salmon increased approximately 8 percent over that for 1932. By districts, southeastern Alaska and western Alaska showed gains of 4 percent and 28 percent, respectively, while in central Alaska the catch decreased about 2 percent.

There was an increase of 37 percent for the whole of Alaska in the number of fathoms of seines used, 13 percent in the number of fathoms of gill nets, and about 17 percent in the number of traps, as compared with those in operation in 1932.

#### CATCH AND APPARATUS

The total number of seines used in the salmon industry in 1933 was 491, of which 389 were purse seines and 102 beach seines. The purse seines aggregated 59,345 fathoms of webbing, and the beach seines 10,102 fathoms. The number of gill nets used was 3,282, having a total length of 223,660 fathoms. There were 139 driven and 261 floating traps—a total of 400.

Southeastern Alaska was accredited with 324 seines, or a total of 52,275 fathoms, an increase of 131 seines and 17,820 fathoms of webbing from the number used in 1932; also with 265 gill nets, aggregating 24,625 fathoms, an increase of 107 nets and 12,500 fathoms of webbing; and with 19 driven and 242 floating traps, a decrease of 3 driven and an increase of 71 floating traps, as compared with the number operated in 1932.

Corresponding figures for central Alaska show 158 seines, or 15,632 fathoms, as compared with 134 seines, or 15,520 fathoms, in 1932;

## Summary of persons engaged and products of the Alaska fisheries in 1933

Items	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
<b>PERSONS ENGAGED</b>								
Whites.....	4,504	---	3,181	---	3,674	---	11,359	---
Natives.....	3,133	---	1,182	---	1,247	---	5,562	---
Chinese.....	91	---	157	---	349	---	597	---
Japanese.....	441	---	226	---	302	---	969	---
Filipinos.....	963	---	661	---	590	---	2,214	---
Mexicans.....	8	---	4	---	893	---	905	---
Negroes.....	2	---	---	---	55	---	57	---
Miscellaneous.....	16	---	3	---	13	---	32	---
Total.....	9,158	---	5,414	---	7,123	---	21,695	---
<b>PRODUCTS</b>								
Salmon:								
Canned.....cases	2,087,951	\$9,598,789	1,485,994	\$7,859,158	1,651,659	\$10,918,067	5,225,604	\$28,376,014
Mild cured.....pounds	3,817,600	612,393	---	---	105,600	10,435	3,923,200	622,828
Pickled.....do	14,000	---	342,450	27,108	678,500	45,886	1,034,950	73,920
Fresh, for food.....do	559,287	30,601	---	---	---	---	559,287	30,601
Fresh, for food.....do	4,236,252	221,382	---	---	---	---	4,236,252	221,382
Fresh, for halibut bait.....do	48,700	277	15,300	100	---	---	64,000	377
Dry salted and dried.....cases	100	520	31,425	641	1,368,107	54,640	1,399,532	55,281
Smoked and canned.....pounds	600,000	9,900	313,324	2,647	16	75	913,358	3,242
Fertilizer.....gallons	20,000	3,000	15,700	4,779	---	---	35,700	14,679
Oil.....pounds	---	---	---	2,748	---	---	---	5,748
Halibut:								
Fresh.....pounds	8,260,476	415,533	22,081	1,790	---	---	8,282,557	417,323
Frozen.....do	5,786,374	308,739	---	---	---	---	5,786,374	308,739
Herring:								
Fresh, for bait.....do	2,413,220	21,232	562,300	5,014	---	---	2,975,520	26,246
Frozen, for bait.....do	1,496,370	12,263	---	---	---	---	1,496,370	12,263
Pickled, for food:.....do	---	---	---	---	---	---	---	---
Scotch cure.....do	---	---	---	---	---	---	---	---
Norwegian cure.....do	---	---	---	---	---	---	---	---
Roused, for food (bloater stock).....do	3,874,703	174,284	7,177,000	338,065	1,599,025	73,982	12,651,328	586,331
Spiced.....do	---	---	---	---	253,700	11,819	280,950	14,019
Dry-salted.....do	31,250	1,750	6,000	450	509,790	17,474	509,790	17,474
Meal.....do	1,000	125	---	---	---	---	1,000	125
Oil.....gallons	---	---	---	---	54,200	2,020	54,200	2,020
Total.....	17,534,860	277,611	4,496,000	71,911	---	---	22,030,860	349,522
	2,509,573	318,797	595,248	75,397	---	---	3,104,821	394,194

[illegible]

<sup>1</sup> These figures represent the value of the manufactured product. It is estimated that the value of the catch, exclusive of whales, to the fishermen was approximately \$9,089,000. The round weight of the salmon catch landed by the fishermen was approximately 467,349,000 pounds, and the corresponding figure for herring was about 140,580,000 pounds. The cod figures given above do not include the offshore catch from waters adjacent to Alaska, which amounted to 4,860,060 pounds of dry-salted cod and 30,400 pounds of tongues, having a total value of \$166,601, landed at ports of the Pacific Coast States.

956 gill nets, or 44,410 fathoms, as compared with 1,499 gill nets, or 63,105 fathoms, in 1932; and 119 driven and 19 floating traps, as compared with 127 driven and 22 floating traps in 1932.

In western Alaska, 9 seines, or 1,540 fathoms of webbing, were used, an increase of 5 seines and 765 fathoms of webbing over the figures for 1932. There were 2,061 gill nets used, or an aggregate of 154,625 fathoms, an increase of 155 nets and 31,859 fathoms of webbing. One driven trap was operated, the same as in 1932.

Seines caught 21 percent of the salmon taken in 1933, gill nets 33 percent, and traps 45 percent, while lines and wheels took the remaining 1 percent.

*Percentage of salmon caught in each Alaska district, by principal forms of apparatus*

Apparatus	Southeast Alaska		Central Alaska		Western Alaska	
	1932	1933	1932	1933	1932	1933
Seines.....	20	31	15	28	5	1
Gill nets.....	2	2	10	8	90	97
Traps.....	74	65	75	64	-----	-----
Lines.....	4	2	-----	-----	-----	-----
Wheels.....	-----	-----	-----	-----	5	2

The total catch of salmon in 1933 was 81,876,420, an increase of 6,192,845, or 8 percent, over the number taken in 1932. The southeastern and western districts showed gains of 1,123,677 and 5,649,932, respectively, while there was a decrease of 580,764 in central Alaska. By species, the catch of pinks increased 3,536,780 and reds 4,737,752, while the catch of cohos decreased 125,362, chums 1,682,748, and kings 273,577.

*Salmon taken in 1933, by apparatus and species, in each geographic section of Alaska*

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
<b>Seines:</b>				
Coho, or silver.....	150,347	38,500	-----	188,847
Chum, or keta.....	2,401,739	733,250	15,337	3,150,326
Pink, or humpback.....	7,410,854	5,021,511	-----	12,432,365
King, or spring.....	1,026	929	1,638	3,593
Red, or sockeye.....	212,352	771,940	360,878	1,345,170
Total.....	10,176,313	6,566,130	377,853	17,120,301
<b>Gill nets:</b>				
Coho, or silver.....	144,096	172,467	16,859	333,422
Chum, or keta.....	54,169	39,074	634,777	727,960
Pink, or humpback.....	186,323	193,674	28	380,025
King, or spring.....	20,621	60,145	66,337	147,106
Red, or sockeye.....	210,685	1,301,672	23,902,978	25,415,335
Total.....	615,837	1,767,632	24,620,979	27,003,848
<b>Traps:</b>				
Coho, or silver.....	571,425	515,251	-----	1,086,676
Chum, or keta.....	2,091,554	1,455,080	-----	3,546,634
Pink, or humpback.....	18,186,018	8,774,005	-----	26,960,023
King, or spring.....	7,655	34,665	-----	42,320
Red, or sockeye.....	587,423	4,286,614	2,344	4,876,381
Total.....	21,444,075	15,065,615	2,344	36,512,034

*Salmon taken in 1933, by apparatus and species, in each geographic section of Alaska—Continued*

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
<b>Lines:</b>				
Coho, or silver.....	357, 213	-----	-----	357, 213
King, or spring.....	397, 884	-----	-----	397, 884
Total.....	755, 097	-----	-----	755, 097
<b>Wheels:</b>				
Chum, or keta.....	-----	-----	467, 300	467, 300
King, or spring.....	-----	-----	17, 840	17, 840
Total.....	-----	-----	485, 140	485, 140
<b>Total:</b>				
Coho, or silver.....	1, 223, 081	726, 218	16, 859	1, 966, 158
Chum, or keta.....	4, 547, 402	2, 227, 404	1, 117, 414	7, 892, 220
Pink, or humpback.....	25, 783, 195	13, 989, 190	28	39, 772, 413
King, or spring.....	427, 189	95, 739	85, 815	608, 743
Red, or sockeye.....	1, 010, 460	6, 360, 226	24, 266, 200	31, 636, 886
Grand total.....	32, 901, 327	23, 398, 777	25, 486, 316	81, 876, 420

### CANNING

#### CHANGES IN CANNERIES

The plant of the Alaska Pacific Salmon Corporation at Kake that had been leased to Libby, McNeill & Libby for the season of 1932 was operated this year by the former company, which also reopened its cannery at Rose Inlet. The 5-year lease on the Metlakatla cannery to the Annette Island Packing Co. having expired at the close of 1932, a new company, incorporated under the name of Annette Island Canning Co., obtained the lease and operated the plant in 1933.

Two plants at Ketchikan that had been closed in 1932, the Iwersen Packing Co. and the floating plant *Pioneer*, of the Stuart Corporation, were taken over and operated by new organizations, the Kelly Packing Co. and the Berg Packing Co., respectively. Other new organizations which were formed to take over canneries in southeast Alaska and operate them under lease during the season were as follows: The Ocean Packing Co., which operated the plant of the Bayview Packing Co. at Klawak; the Douglas Fisheries Co., which operated the plant on Douglas Island that had been leased to the Ellson Packing Co. in 1932; the Klawock Packing Co., which took over the Demmert Packing Co.'s cannery at Klawak; Hanseth Bros., who operated the Scow Bay cannery that had been leased to O. Nicholson in 1932; and the Deep Sea Salmon Co., which operated the Skowl Arm Packing Co.'s plant at Skowl Arm.

The New England Fish Co. reopened its plants at Ketchikan and Noyes Island; and the plants of the Peril Straits Packing Co. and Petersburg Packing Co. at Todd and Petersburg, respectively, were also reopened and operated. A new cannery building was erected by the Diamond K Packing Co. at Wrangell on the site formerly occupied by the Alaska Sanitary Packing Co.'s plant, which was destroyed by fire in 1924. The new plant, which was in operation this year, replaces the floating cannery that has been used by the company since 1927.

All properties of the Northwestern Fisheries Co. in Alaska were leased by the Pacific American Fisheries, with option to purchase. The latter utilized some of the gear during the season, but none of the canneries was operated.

Joint operating arrangements, without any change of business organization, were again carried on by a number of canning companies to reduce the cost of production. The Standard Packing Co., which had been formed for the joint operation of the Pioneer Sea Foods Co. and the Shepard Point Packing Co. in 1932, was discontinued, and the latter companies resumed separate operations.

The cannery of the Columbia River Packers Association at Chignik was operated under lease by the Alaska Packers Association, as it had been in 1932, the latter's own plant remaining idle during the season. A new organization, the Glacier Sea Foods Co., leased and operated the cannery of the Glacier Packing Co. at Cordova. The cannery of A. N. Nilsen at Portlock and the San Juan Fishing & Packing Co.'s plant at Uganik Bay, which were idle in the previous year, were reopened and operated in 1933.

The Kustatan Packing Co. at Kustatan, which had devoted its operations chiefly to the production of canned clams in 1932, again engaged primarily in the canning of salmon. The Pioneer Packing Co., now known as the Pioneer Canneries, Inc., terminated its lease on the Hemrich Packing Co.'s cannery at Kukak Bay, and the plant was closed.

As its new shore cannery at Sand Point was ready for operation this year, the Alaska Pacific Salmon Corporation did not lease the floating plant *International*, as in the two previous seasons, and the operation of the latter was carried on by the International Packing Co. Toward the close of 1933 the International Packing Co. acquired the plant at Uzinki formerly operated by the Katmai Packing Co., which has been idle since 1930.

The floating plant *Santa Flavia*, of the Associated Fishermen of Alaska, Inc., was leased to the Lowe Trading Co. and operated near the mouth of the Nushagak River. The Red Salmon Canning Co. reopened its plant on the Ugashik River, which had been closed since 1929. Operations of the Herendeen Bay Consolidated Canneries were carried on aboard the floating cannery *Mazama*, of the Everett Packing Co., which had not been used as a cannery since 1930.

#### NEW CANNERIES

Three new canneries, in the central district, are included in the list of canneries operated in Alaska in 1933. These are the plants of A. S. Day at Fort Liscum, the Enterprise Seafood Co. at Ninilchik, and the new shore cannery of the Alaska Pacific Salmon Corporation at Sand Point.

#### CANNERIES NOT OPERATED

Eleven canneries that were operated in the previous year were closed during the 1933 season, 1 of which was in southeastern, 9 in central, and 1 in western Alaska. The plant of the Kenai River Packing Co., at Kenai, and the plant formerly belonging to the Hetta Packing Co., at Coppermount, which has been acquired by

the Nakat Packing Corporation, have been dropped from the list of idle plants, as there is little likelihood of their being operated again.

The following canneries were closed during the year but may be reopened:

#### Southeast Alaska:

Alaska Pacific Fisheries-----	Burnett Inlet.
	Boca de Quadra.
	Chomly.
Alaska Pacific Salmon Corporation-----	Funter Bay.
	Pybus Bay.
	Tenakee.
Alaska Packers Association-----	Loring.
	Wrangell.
Alaska Sanitary Packing Co-----	Cape Fanshaw.
Columbia River Packers Association-----	Lake Bay.
Hoonah Packing Co-----	Hoonah.
	Gambier Bay.
Icy Straits Fisheries, Inc. (floating plant)-----	Idaho Inlet.
Libby, McNeill & Libby-----	Klawak.
The Nakat Packing Corporation-----	Ketchikan.
New England Fish Co-----	Chatham.
	Yakutat.
	Boca de Quadra.
	Dundas Bay.
	Excursion Inlet.
Pacific American Fisheries-----	Hunter Bay.
	Kasaan.
	Ketchikan.
	Port Walter.
	Santa Ana.
	Shakan.

#### Central Alaska:

Alaska Pacific Salmon Corporation-----	Drier Bay.
Alaska Packers Association-----	Alitak.
	Chignik.
	Kasilof.
Alitak Fish Co-----	Zachar Bay.
Anderson Mercantile Co., Inc-----	Deep Creek.
Blue Island Packing Co-----	Blue Fox Bay.
W. G. Culver-----	Point McManus.
Farwest Fisheries, Inc-----	Anchorage.
Fidalgo Island Packing Co-----	Port Graham.
Gustan & Vogel-----	Point Possession.
Hemrich Packing Co-----	Kukak Bay.
International Packing Co-----	Uzinki.
Kadiak Fisheries Co-----	Shearwater Bay.
New England Fish Co-----	Cordova.
North Coast Packing Co-----	Ninilchik.
Northern Light Packing Co-----	Mountain Slough.
	Bering River.
	Chignik.
	Kenai.
Pacific American Fisheries-----	King Cove.
	Orca.
	Unakwik Inlet.
	Uyak.
	Valdez.
Charles W. Pajoman-----	Iron Creek.
Point Possession Fish Co-----	Point Possession.
Port Williams Packing Corporation-----	Port Williams.
Prince Packing Co-----	Drier Bay.
Redoubt Bay Packing Co-----	Redoubt Bay.
San Juan Fishing & Packing Co-----	Tutka Bay.
E. Sandvik-----	Swansons Creek.
Shelikof Packing Co-----	Zachar Bay.

## Central Alaska—Continued.

Shepard Point Packing Co.....	Port Ashton.
Harvey J. Smith.....	West Foreland.
Spur Fish Corporation.....	Nikishka Bay.
Strand-Jensen Fisheries Co.....	Cordova.
Sunset Packing Co.....	Otter Creek.
Toman Packing Co.....	Anchorage.
Trinity Packing Co.....	Three Saints Bay.
John Wik.....	Kenai.
Jake Young.....	Port Chatham.

## Western Alaska:

Alaska Packers Association.....	{ Naknek River.
Columbia River Packers Association.....	{ Nushagak Bay.
	{ Nushagak Bay
	only.
Herendeen Bay Consolidated Canneries.....	Herendeen Bay.
Pacific American Fisheries.....	{ Naknek River.
	{ Nushagak.
	{ Port Moller.
Red Salmon Canning Co.....	Naknek River.

## TOTAL CANNERIES OPERATED

There were 91 canneries operated in Alaska in 1933—37 in southeast, 32 in central, and 22 in western Alaska—which is 6 more in the southeast and 2 less in the central district than in 1932, a net gain of 4 plants. The International Packing Co. operated the floating cannery *International* in both the central and western districts, and the Herendeen Bay Consolidated Canneries prepared a small pack aboard the *Mazama* in southeast Alaska on its return from operations in Herendeen Bay, but each is included but once in the total, the former being credited to central and the latter to western Alaska.

*Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1933*

[New canneries indicated by (\*)]

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska:					
Alaska Pacific Salmon Corporation.....	4	Kake.....		9	9
		Ketchikan.....	4	2	6
		Port Althorp.....		12	12
		Rose Inlet.....		6	6
Annette Island Canning Co.....	1	Metlakatla.....		6	6
Astoria & Puget Sound Canning Co.....	1	Excursion Inlet.....		9	9
Beegle Packing Co.....	1	Ketchikan.....	1	3	4
Berg Packing Co.....	1	Tongass Narrows (floating). <sup>1</sup>			
Columbia River Packers Association.....		Lake Bay.....		2	2
Deep Sea Salmon Co.....	1	Skowl Arm.....		8	8
Diamond K Packing Co.....	1	Wrangell.....		5	5
Douglas Fisheries Co.....	1	Douglas.....			
Fidalgo Island Packing Co.....	2	Bay of Pillars.....	5		5
		Ketchikan.....	2	5	7
Haines Packing Co.....	1	Letnikof Cove.....			
Hanseth Bros.....	1	Scow Bay.....		1	1
P. E. Harris & Co.....	1	Hawk Inlet.....		7	7
Herendeen Bay Consolidated Canneries.....	1	Tebenkof Bay (floating). <sup>1</sup>			
Hood Bay Canning Co.....	1	Hood Bay.....		4	4
Independent Salmon Canneries (Inc.).....	1	Ketchikan.....		1	1
Kelly Packing Co.....	1	do.....			
Ketchikan Packing Co.....	1	do.....		2	2
Klawock Packing Co.....	1	Klawak.....			
Libby, McNeill & Libby.....	3	Craig.....	2	15	17
		George Inlet.....		7	7
		Yakutat.....			
		Hidden Inlet.....		7	7
Nakat Packing Corporation, The.....	3	Union Bay.....		6	6
		Waterfall.....		11	11

<sup>1</sup> Traps only were operated, the fish being packed at other canneries.



*Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1933—Continued*

Company	Canneries		Traps		
	Num- ber	Location	Driven	Float- ing	Total
<b>Southeast Alaska:</b>					
New England Fish Co. ....	2	{ Ketchikan .....		6	6
Ocean Packing Co. ....	1	{ Noyes Island.....		6	6
Pacific American Fisheries.....		Klawak .....			
Peril Straits Packing Co. ....	1	Excursion Inlet <sup>1</sup> .....	1	5	6
Petersburg Packing Co. ....	1	Todd .....		5	5
Pyramid Packing Co., Inc. ....	1	Petersburg.....	2	7	9
Sebastian Stuart Fish Co. ....	1	Sitka .....		4	4
Superior Packing Co. ....	1	Tyee .....		7	7
Ward's Cove Packing Co. ....	1	Tenakee .....		5	5
Wrangell Packing Co. ....	1	Ward Cove .....		5	5
		Wrangell.....		1	1
<b>Central Alaska:</b>					
Alaska Pacific Salmon Corporation.....	1	Sand Point * .....	2		2
Alaska Packers Association.....	2	{ Chignik .....	2		2
Alaska Year-Round Canneries Co. ....	1	{ Karluk .....	4		4
Alitak Fish Co. ....	1	Seldovia .....	3		3
Columbia River Packers Association.....	1	Alitak .....	8		8
Cook Inlet Packing Co. ....	1	Chignik <sup>1</sup> .....	4		4
Copper River Packing Co. ....	1	Seldovia .....	6		6
Harry W. Crosby .....	1	McClure Bay .....		5	5
A. S. Day .....	1	Chignik .....			
H. J. Emsard .....	1	Fort Liscum * .....			
Enterprise Seafood Co. ....	1	Anchorage .....	4		4
Farwest Fisheries, Inc. ....	1	Ninilchik * .....			
Glacier Sea Foods Co. ....	1	Anchorage <sup>1</sup> .....	2		2
Grimes Packing Co. ....	1	Cordova (floating) .....			
P. E. Harris & Co. ....	1	Uzink .....			
International Packing Co. ....	1	False Pass .....	8		8
		Kupreanof Harbor and Uyak Bay (floating) .....			
Kodiak Fisheries Co. ....	1	Kodiak .....	5		5
Kustatan Packing Co. ....	1	Kustatan .....			
Libby, McNeill & Libby.....	1	Kenai .....	10		10
A. N. Nilson .....	1	Portlock .....			
Ninilchik Packing Co. ....	1	Ninilchik .....	1		1
North Coast Packing Co. ....	1	do <sup>1</sup> .....	2		2
Pacific American Fisheries.....	1	{ Chignik <sup>1</sup> .....	2		2
Pioneer Canneries, Inc. ....	1	{ Ikatan .....	15		15
Pioneer Sea Foods Co. ....	1	Cordova .....			
Premier Salmon Co. ....	1	Eyak River .....	1	3	4
Sandvik & Sandvik .....	1	Stevens Creek .....	3	1	4
San Juan Fishing & Packing Co. ....	2	Uganik Village .....			
Seward Fisheries, Inc. ....	1	{ Port San Juan .....	2	3	5
Shepard Point Packing Co. ....	1	{ Uganik Bay .....	5		5
Shumagin Packing Co. ....	1	Seward .....			
Snug Harbor Packing Co. ....	1	Shepard Point .....		7	7
Uganik Fisheries, Inc. ....	1	Squaw Harbor .....	3		3
		Snug Harbor .....	6		6
		Uganik .....	3		3
<b>Western Alaska:</b>					
Alaska Packers Association.....	7	{ Egegik River.....			
		{ Kvichak Bay (2) .....			
		{ Naknek River (2) .....			
		{ Nushagak Bay .....			
		{ Ugashik River .....			
Alaska-Portland Packers Association.....	2	{ Naknek River .....			
Alaska Salmon Co. ....	1	{ Nushagak Bay .....			
Bristol Bay Packing Co. ....	1	{ Wood River .....			
Herendeen Bay Consolidated Canneries.....	1	{ Kvichak Bay .....			
		{ Herendeen Bay (float- ing) .....	1		1
International Packing Co. ....	1	{ Port Moller (floating) .....			
		{ Egegik River.....			
		{ Ekuk .....			
Libby, McNeill & Libby.....	6	{ Koggiung .....			
		{ Libbyville .....			
		{ Lockanok .....			
		{ Nushagak .....			
Lowe Trading Co. ....	1	{ Nushagak River (floating) .....			
Nakat Packing Corporation, The.....	1	{ Nakeen .....			
Red Salmon Canning Co. ....	2	{ Naknek River .....			
		{ Ugashik River .....			

<sup>1</sup> Traps only were operated, the fish being packed at other canneries.

## LOSSES AND DISASTERS

In southeastern Alaska the plant of Libby, McNeill & Libby at Karheen, which had not been operated since 1930, was destroyed by fire on August 18. Other property losses in that district included motor boats, miscellaneous fishing gear, and equipment, valued at \$28,805.

Reported losses in central Alaska were a pile driver, small boats, and fishing gear valued at \$16,827; and in the western district, small boats, fish nets, and damage to buildings, amounting to \$25,068.

Twenty-two lives were lost—9 in southeast Alaska, 7 in central, and 6 in western Alaska. In the southeastern district 5 fishermen were drowned, and 2 fishermen and 2 shoresmen were killed in accidents. One fisherman and 1 transporter in central Alaska were drowned, 1 fisherman and 3 shoresmen died of disease, and 1 transporter met death by accident. In western Alaska 2 fishermen and 2 shoresmen were drowned, and 2 fishermen died of disease.

## STATISTICS

There were 91 canneries operated in Alaska in 1933, or 4 more than in the previous year. Employment was given to 17,130 persons, as compared with 15,738 in 1932, an increase of 1,392. White employees increased 408; natives, 648; Japanese, 165; Filipinos, 230; Mexicans, 12; Negroes, 5; and miscellaneous (Kanakas, Koreans, and Puerto Ricans), 11; while Chinese decreased 87.

The total pack of canned salmon was 5,225,604 cases, valued at \$28,376,014. This was a decrease of 28,879 cases, or about one-half of 1 percent, from the pack of 1932, but an increase in value of \$6,660,213, or about 31 percent. The output in southeast Alaska decreased from 2,208,053 to 2,087,951 cases, or 5 percent; and in central Alaska from 1,624,598 cases to 1,485,994 cases, or about 9 percent; while in western Alaska there was an increase from 1,421,832 cases to 1,651,659 cases, or 16 percent. In Alaska as a whole the pack of reds increased from 2,103,081 cases to 2,180,283 cases, or 4 percent; pinks increased from 2,113,145 to 2,182,551 cases, or 3 percent; and cohos from 148,175 to 162,568 cases, or 10 percent; while chums decreased from 820,556 to 658,789 cases, or 20 percent; and kings from 69,526 to 41,413 cases, or 40 percent.

Data are included in the following tables to show comparison of the 1933 pack with the average for the 5 preceding years, 1928 to 1932, by cases of each species and by districts. Only one species—red salmon—shows a gain over the 5-year average, and this gain is entirely offset by the declines in the other species. By districts, the pack in western Alaska increased 44 percent, while in southeast and central Alaska the pack decreased 18 and 14 percent, respectively, making a net decrease of 4 percent from the 5-year average.

*Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1933*

Items	Southeast Alaska	Central Alaska	Western Alaska	Total
<b>PERSONS ENGAGED</b>				
Fishermen:				
Whites.....	795	717	1,769	3,281
Natives.....	1,281	428	399	2,108
Filipinos.....	3		3	6
Mexican.....	1			1
Miscellaneous <sup>1</sup> .....		2		2
Total.....	2,080	1,147	2,171	5,398
Shoresmen:				
Whites.....	1,340	920	1,452	3,712
Natives.....	1,363	598	128	2,089
Chinese.....	90	156	349	595
Japanese.....	419	222	302	943
Filipinos.....	950	655	587	2,192
Mexicans.....	4	4	893	901
Negroes.....	2		55	57
Miscellaneous <sup>1</sup> .....	16		13	29
Total.....	4,184	2,555	3,779	10,518
Transporters:				
Whites.....	502	334	337	1,173
Natives.....	3	33		36
Japanese.....	1			1
Filipinos.....	3			3
Miscellaneous <sup>1</sup> .....		1		1
Total.....	509	368	337	1,214
Total:				
Whites.....	2,637	1,971	3,558	8,166
Natives.....	2,647	1,059	527	4,233
Chinese.....	90	156	349	595
Japanese.....	420	222	302	944
Filipinos.....	956	655	590	2,201
Mexicans.....	5	4	893	902
Negroes.....	2		55	57
Miscellaneous <sup>1</sup> .....	16	3	13	32
Grand total.....	6,773	4,070	6,287	17,130
Wages paid shoresmen.....	\$999,146	\$760,444	\$1,145,329	\$2,904,919
Wages paid transporters.....	191,387	130,445	114,352	436,184
<b>OPERATING UNITS</b>				
Plants:				
Shore canneries.....	36	30	20	86
Floating canneries:				
Power vessels.....		1	2	3
Net tonnage.....		1,760	3,024	4,784
Barges.....	1	1		2
Net tonnage.....	1,092	389		1,481
Total plants operated.....	37	32	22	91
Vessels:				
Power, over 5 tons.....	293	161	80	474
Net tonnage.....	5,752	4,718	21,191	31,661
Launches.....	76	122	28	226
Power dories.....	31	64		95
Gill-net boats.....	140	96	1,027	1,263
Seine skiffs.....	118	114		232
Other rowboats and skiffs.....	605	460	150	1,215
Lighters and scows.....	162	162	138	462
Houseboats.....	12	2	32	46
Pile drivers.....	19	19	16	54
Pile pullers.....	3	4		7
Rigging scows.....	30	5		35
Apparatus:				
Purse seines.....	321	61	6	338
Fathoms.....	51,975	5,845	1,426	59,245
Beach seines.....	3	81		84
Fathoms.....	300	8,807		9,107
Gill nets.....	258	932	1,382	2,572
Fathoms.....	24,375	43,535	142,967	210,877
Traps, driven.....	19	119	1	139
Traps, floating.....	242	19		261

<sup>1</sup> Kanakas, Koreans, and Puerto Ricans.

*Output and value of canned salmon in Alaska in 1933<sup>1</sup>*

Product	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Coho, or silver:								
½-pound flat.....	2,972	\$22,335	395	\$2,368			3,367	\$24,703
1-pound flat.....	2,096	12,576	2,561	14,133			4,657	26,709
1-pound tall.....	90,737	472,569	62,351	313,521	1,456	\$7,517	154,544	793,607
Total.....	95,805	507,480	65,307	330,022	1,456	7,517	162,568	845,019
Chum, or keta:								
½-pound flat.....	250	1,365	408	2,287			658	3,652
1-pound flat.....	424,611	1,728,120	207,471	865,780	26,049	115,254	658,131	2,709,154
Total.....	424,861	1,729,485	207,879	868,067	26,049	115,254	658,789	2,712,806
Pink, or humpback:								
½-pound flat.....	10,540	64,660	4,317	27,629			14,857	92,289
1-pound flat.....	1,467,473	6,664,922	700,221	3,116,508			2,167,694	9,781,430
Total.....	1,478,013	6,729,582	704,538	3,144,137			2,182,551	9,873,719
King, or spring:								
½-pound flat.....	1,084	9,676	7,397	79,637	1,474	14,745	9,955	104,058
1-pound flat.....	3,189	27,608	3,811	31,032	3,021	28,480	10,021	87,120
1-pound tall.....	3,873	21,111	12,578	69,964	4,986	28,929	21,437	120,004
Total.....	8,146	58,395	23,786	180,633	9,481	72,154	41,413	311,182
Red, or sockeye:								
½-pound flat.....	12,827	121,842	40,664	392,209	147	1,073	53,638	515,124
1-pound flat.....	3,832	30,656	54,651	411,717	1,569	10,277	60,052	452,650
1-pound tall.....	64,467	421,349	389,169	2,532,373	1,612,957	10,711,792	2,066,593	13,665,514
Total.....	81,126	573,847	484,484	3,336,299	1,614,673	10,723,142	2,180,283	14,633,288
Grand total.....	2,087,951	9,598,789	1,485,994	7,850,158	1,651,659	10,918,067	5,225,604	28,376,014

<sup>1</sup> Cases containing ½-pound cans have been reduced one-half in number, and thus, for the purpose of affording fair comparison, all are put upon the basis of forty-eight 1-pound cans to the case.

*Output of canned salmon in Alaska, in cases, 1928 to 1933<sup>1</sup>*

## BY SPECIES

Product	1928	1929	1930	1931	1932	Average for 5-year period, 1928-32	1933	Percent-age increase or decrease in 1933, as compared with 5-year average
Coho, or silver:								
½-pound flat.....			371			74		-100.00
1-pound flat.....	13,498	7,880	18,808	9,962	3,442	10,718	3,367	-68.59
1-pound tall.....	5,840	6,730	5,926	2,902	1,763	4,632	4,657	+0.54
Total.....	279,285	157,346	307,317	157,014	142,970	208,787	154,544	-25.98
Total.....	298,623	171,956	332,422	169,878	148,175	224,211	162,568	-27.49
Chum, or keta:								
½-pound flat.....	5,057	4,961	8,384	4,242	624	4,654	658	-85.86
1-pound flat.....	4			35		8		-100.00
1-pound tall.....	990,724	859,551	591,550	520,579	819,932	758,267	658,131	-13.21
Total.....	995,785	864,512	599,934	533,856	820,556	762,929	658,789	-13.65

<sup>1</sup> The number of cases shown has been put upon the common basis of forty-eight 1-pound cans per case.

## Output of canned salmon in Alaska, in cases, 1928 to 1933—Continued

## BY SPECIES—Continued

Product	1928	1929	1930	1931	1932	Average for 5- year period, 1928-32	1933	Percent- age increase or decrease in 1933, as com- pared with 5-year average
<b>Pink, or humpback:</b>								
1/2-pound flat.....			1, 113			222		-100.00
1/2-pound flat.....	40, 473	44, 762	81, 064	46, 524	7, 166	43, 998	14, 857	-66.23
1-pound flat.....	6, 189	3, 910	4, 867	4, 410		3, 875		-100.00
1-pound tall.....	2, 740, 580	2, 522, 985	3, 101, 490	2, 902, 926	2, 105, 979	2, 674, 792	2, 167, 694	-18.96
Total.....	2, 787, 242	2, 571, 657	3, 188, 534	2, 953, 860	2, 113, 145	2, 722, 887	2, 182, 551	-19.84
<b>King, or spring:</b>								
1/2-pound flat.....	11, 782	16, 320	17, 840	13, 208	11, 713	14, 172	9, 955	-29.76
1/2-pound flat.....	14, 854	26, 808	23, 686	16, 721	14, 800	19, 374	10, 021	-48.28
1-pound tall.....	27, 523	28, 979	18, 396	21, 938	43, 013	27, 970	21, 437	-23.36
Total.....	54, 159	72, 107	59, 922	51, 867	69, 526	61, 516	41, 413	-32.68
<b>Red, or sockeye:</b>								
1/2-pound flat.....			370			74		-100.00
1/2-pound flat.....	89, 063	100, 136	110, 605	58, 178	47, 707	81, 138	53, 638	-33.89
1-pound flat.....	87, 100	75, 326	62, 972	41, 002	75, 524	68, 385	60, 052	-12.19
1-pound tall.....	1, 771, 931	1, 514, 465	677, 567	1, 595, 098	1, 979, 850	1, 507, 782	2, 066, 593	+37.06
Total.....	1, 948, 094	1, 689, 927	851, 514	1, 694, 278	2, 103, 081	1, 657, 379	2, 180, 283	+31.55
<b>Grand total.....</b>	<b>6, 083, 903</b>	<b>5, 370, 159</b>	<b>5, 032, 326</b>	<b>5, 403, 739</b>	<b>5, 254, 483</b>	<b>5, 428, 922</b>	<b>5, 225, 604</b>	<b>-3.75</b>

## BY DISTRICTS AND SPECIES

<b>Southeast Alaska:</b>								
Coho, or silver.....	145, 770	97, 847	155, 652	88, 455	87, 038	114, 952	95, 805	-16.66
Chum, or keta.....	570, 219	290, 797	283, 478	274, 248	579, 443	399, 637	424, 861	+6.31
Pink, or humpback.....	2, 142, 838	1, 542, 615	2, 309, 976	2, 013, 442	1, 379, 006	1, 877, 576	1, 478, 013	-21.28
King, or spring.....	5, 522	7, 000	6, 939	14, 896	23, 624	11, 596	8, 146	-29.75
Red, or sockeye.....	106, 798	162, 952	221, 241	147, 895	138, 942	155, 566	81, 126	-47.85
Total.....	2, 971, 147	2, 101, 211	2, 977, 286	2, 538, 936	2, 208, 053	2, 559, 327	2, 087, 951	-18.42
<b>Central Alaska:</b>								
Coho, or silver.....	152, 360	71, 330	173, 352	81, 331	60, 674	107, 809	65, 307	-39.42
Chum, or keta.....	377, 857	497, 774	284, 751	193, 053	147, 410	300, 169	207, 879	-30.75
Pink, or humpback.....	643, 330	1, 025, 652	859, 761	940, 418	724, 051	838, 642	704, 538	-15.99
King, or spring.....	35, 036	35, 661	32, 060	27, 599	32, 302	32, 532	23, 786	-26.88
Red, or sockeye.....	430, 572	454, 086	268, 621	439, 153	660, 161	450, 519	484, 484	+7.54
Total.....	1, 639, 155	2, 084, 503	1, 618, 545	1, 681, 551	1, 624, 598	1, 729, 671	1, 485, 994	-14.09
<b>Western Alaska:</b>								
Coho, or silver.....	493	2, 779	3, 418	92	463	1, 449	1, 456	+1.48
Chum, or keta.....	47, 709	75, 941	31, 705	66, 555	93, 703	63, 123	26, 049	-58.73
Pink, or humpback.....	1, 074	3, 390	18, 797		10, 088	6, 670		-100.00
King, or spring.....	13, 601	29, 446	20, 923	9, 372	13, 600	17, 388	9, 481	-45.47
Red, or sockeye.....	1, 410, 724	1, 072, 889	361, 652	1, 107, 230	1, 303, 978	1, 051, 294	1, 614, 673	+53.59
Total.....	1, 473, 601	1, 184, 445	436, 495	1, 183, 249	1, 421, 832	1, 139, 924	1, 651, 659	+44.89
<b>Grand total.....</b>	<b>6, 083, 903</b>	<b>5, 370, 159</b>	<b>5, 032, 326</b>	<b>5, 403, 739</b>	<b>5, 254, 483</b>	<b>5, 428, 922</b>	<b>5, 225, 604</b>	<b>-3.75</b>

*Relative importance of each species of canned salmon within each district in 1933*

District	Coho	Chum	Pink	King	Red	Total, all species
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Southeast Alaska.....	4.6	20.3	70.8	0.4	3.9	100.0
Central Alaska.....	4.4	14.0	47.4	1.6	32.6	100.0
Western Alaska.....	.1	1.6	.0	.6	97.7	100.0
All Alaska.....	3.1	12.6	41.8	.8	41.7	100.0

*Relative importance of each district in the production of each species of salmon canned in 1933*

District	Coho	Chum	Pink	King	Red	Total, all species
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Southeast Alaska.....	59.0	64.5	67.7	19.7	3.7	40.0
Central Alaska.....	40.1	31.6	32.3	57.4	22.2	28.4
Western Alaska.....	.9	3.9	.0	22.9	74.1	31.6
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

*Average annual price per case of forty-eight 1-pound cans of salmon, 1923-33*

Product	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Coho, or silver.....	\$5.74	\$6.83	\$9.72	\$8.40	\$8.51	\$7.12	\$7.59	\$8.26	\$6.51	\$4.12	\$5.20
Chum, or keta.....	4.65	4.68	4.44	5.01	5.47	6.06	5.35	3.60	3.19	2.79	4.12
Pink, or humpback.....	4.86	4.93	5.28	5.39	5.87	6.56	6.06	4.17	3.46	3.14	4.52
King, or spring.....	8.56	8.89	11.91	10.37	11.25	11.13	11.92	13.32	9.40	5.46	7.51
Red, or sockeye.....	9.27	9.53	13.12	9.89	12.08	9.41	10.71	12.67	9.20	5.61	6.71

PACK IN CERTAIN DISTRICTS

Statistics of the salmon pack are again presented for subdivisions of the three main districts of Alaska, and comparison is made with similar statistics for 1932. Where the pack at a given cannery is made up of fish from more than one district, as in the case of that at certain Cordova canneries which pack fish caught both in Prince William Sound and in the Copper River area or at various plants in southeastern Alaska which draw for their supply on the catch of more than one district, due segregation has been made in order to credit each district with the pack from salmon caught therein. These districts are described as follows:

WESTERN ALASKA

*Bristol Bay.*—The Bering Sea shore, east and north of the Ugashik River.  
*Port Moller and Herendeen Bay.*—Port Moller, Herendeen Bay, and Nelson Lagoon.

CENTRAL ALASKA

*Ikatan-Shumagin Islands.*—False Pass, Ikatan Bay, King Cove, and the Shumagin Islands.

*Chignik.*—Canneries located at Chignik.

*Kodiak-Afognak Islands.*—Kodiak, Spruce, and Raspberry Islands.

*Cook Inlet.*—The shores of Cook Inlet.

*Prince William Sound.*—Resurrection Bay to Point Whited.

*Copper and Bering Rivers.*—Point Whited to Bering River.

## SOUTHEASTERN ALASKA

*Yakutat and Dry Bay.*—Yakutat Bay to and including Dry Bay.

*Icy Strait-Lynn Canal.*—West coast of Baranof and Chichagoof Islands, the shores of Cross Sound, Icy Strait, Lynn Canal, and Stephens Passage, south to Taku Harbor.

*Chatham Strait-Frederick Sound.*—Both shores of Chatham Strait and its bays from Point Augusta to Cape Ommaney, and through Frederick Sound and its bays northward to Taku Harbor, including Kake.

*Sumner Strait-Dixon Entrance.*—Southward from Petersburg and eastward from Port Beauclerc to Cape Chacon and Dixon Entrance, and including all canneries on the mainland and intervening islands from the Stikine River to Portland Canal.

*West coast, Prince of Wales Island.*—Territory west and south of a line from Cape Chacon to Point Baker and Cape Ommaney.

*Pack of canned salmon in Alaska in 1933, by districts<sup>1</sup>*

District	Coho	Chum	Pink	King	Red	Total	Percentage increase or decrease from 1932
	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	
Bristol Bay.....	1,456	24,559	-----	9,197	1,588,008	1,623,220	+21.39
Port Moller and Herendeen Bay.....	-----	1,490	-----	284	26,665	28,439	-66.42
Ikatan-Shumagin Islands.....	17,082	109,608	156,556	3,130	152,073	438,449	-16.83
Chignik.....	4,051	11,188	16,369	249	55,541	87,398	-57.35
Kodiak-Afognak Islands.....	8,222	50,134	331,000	283	108,787	498,426	+35.51
Cook Inlet.....	16,419	5,277	5,951	14,710	98,510	140,867	-16.45
Prince William Sound.....	8,317	31,672	194,646	723	12,786	248,144	-11.15
Copper and Bering Rivers.....	11,216	-----	16	4,691	56,787	72,710	-5.33
Yakutat and Dry Bay.....	15,331	275	5,774	3,216	11,686	36,282	-30.27
Icy Strait-Lynn Canal.....	14,480	97,556	290,238	47	29,480	431,801	-14.24
Chatham Strait-Frederick Sound.....	14,929	172,812	308,211	820	6,445	503,217	+34.59
Sumner Strait-Dixon Entrance.....	33,845	87,999	638,731	493	25,502	786,570	-16.12
West coast, Prince of Wales Island.....	17,220	66,219	235,059	3,570	8,013	330,081	-3.18
Total.....	162,568	658,789	2,182,551	41,413	2,180,283	5,225,604	-0.55

<sup>1</sup> Pack reduced to the basis of forty-eight 1-pound cans per case.

## MILD CURING

The quantity of mild-cured salmon produced in Alaska in 1933 was somewhat less than in the previous year, but prices were decidedly better, and the total value of the product showed a marked increase. An important influence in the price situation was the widespread trollers' strike along the Pacific coast, which continued through May and June.

Only a partial enumeration of the trolling boats in southeastern Alaska was made by the Bureau, as the patrol force that carries on this work in connection with other duties was greatly curtailed by lack of funds. Therefore the more complete figures for 1932 have been used, as reports indicate that there were as many trollers engaged in 1933 as in the previous year. Sixteen plants were engaged in the industry, and the number of persons employed was 1,175.

The total output of mild-cured salmon was 3,923,200 pounds, valued at \$622,828, a decrease of 511,200 pounds in quantity but an increase of \$161,324 in value, as compared with the production for 1932.

*Persons engaged, wages paid, and operating units, Alaska salmon mild-curing industry, 1933*

Item	South-east Alaska	West-ern Alaska	Total	Item	South-east Alaska	West-ern Alaska	Total
PERSONS ENGAGED				OPERATING UNITS			
Fishermen:				Plants:			
Whites.....	664	1	665	Shore.....	11	2	13
Natives.....	360	11	371	Floating:			
Total.....	1,024	12	1,036	Barges.....	3		3
				Net tonnage.....	720		720
Shoresmen:				Total plants operated.....	14	2	16
Whites.....	80	1	81	Vessels:			
Natives.....	12	19	31	Power, over 5 tons.....	152	1	153
Total.....	92	20	112	Net tonnage.....	1,218	50	1,268
Transporters:				Launches.....	589	3	592
Whites.....	23		23	Gill-net boat.....		1	1
Natives.....	2	2	4	Rowboats and skiffs.....	158	5	163
Total.....	25	2	27	Lighters and scows.....	3	1	4
Grand total.....	1,141	34	1,175	Houseboats.....	2		2
Wages paid shoresmen.....	\$57,487	\$2,200	\$59,687	Apparatus:			
Wages paid transporters.....	12,446	270	12,716	Gill nets.....	3	17	20
				Fathoms.....	150	570	720
				Lines.....	3,047		3,047
				Wheels.....		2	2

*Products of Alaska salmon mild-curing industry in 1933*

Products	Southeast Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver.....	252,800	\$26,310			<sup>1</sup> 252,800	\$26,310
Chum, or keta.....	9,600	1,200			<sup>2</sup> 9,600	1,200
King, or spring.....	<sup>3</sup> 3,555,200	584,883	<sup>4</sup> 105,600	\$10,435	<sup>3</sup> 3,660,800	595,318
Total.....	3,817,600	612,393	105,600	10,435	3,923,200	622,828

<sup>1</sup> 316 tierces.

<sup>2</sup> 12 tierces.

<sup>3</sup> 4,444 tierces.

<sup>4</sup> 132 tierces.

<sup>5</sup> 4,576 tierces.

PICKLING

The excellent runs of red salmon in the Bristol Bay region, which enabled the packers to fill all their cans before the end of the fishing season, was undoubtedly the chief factor in accounting for the increased output of pickled salmon in Alaska in 1933. The total production was more than three times that of the preceding year and, with the exception of that for 1931, was the largest for any year since 1926.

One hundred and six persons were engaged in the industry—an increase of 17 over the number employed in 1932. The total output was 1,034,950 pounds, valued at \$73,920, as compared with 305,410 pounds, valued at \$20,629 in 1932—an increase of about 239 percent in quantity and 258 percent in value.



*Persons engaged, wages paid, and operating units, Alaska salmon-pickling industry, 1933*

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
<b>PERSONS ENGAGED</b>				
Fishermen:				
Whites.....	2	24	26	52
Natives.....		10	19	29
Total.....	2	34	45	81
Shoresmen:				
Whites.....			10	10
Natives.....		5	10	15
Total.....		5	20	25
Grand total.....	2	39	65	106
Wages paid shoresmen.....		\$460	\$4,070	\$4,530
<b>OPERATING UNITS</b>				
Plants, shore.....	1	21	8	30
Vessels:				
Power, over 5 tons.....		1		1
Net tonnage.....		11		11
Launches.....	1	5	1	7
Power dories.....		9	2	11
Gill-net boats.....	2	2	4	8
Rowboats and skiffs.....		16	7	23
Scow.....		1		1
Apparatus:				
Purse seine.....		1		1
Fathoms.....		100		100
Beach seines.....		13	3	16
Fathoms.....		750	115	865
Gill nets.....	4	22	40	66
Fathoms.....	100	825	2,325	3,250

*Products of Alaska salmon-pickling industry in 1933*

Species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver.....	5,200	\$260	34,700	\$2,088	800	\$50	40,700	\$2,398
Chum, or keta.....			200	11	4,800	348	5,000	359
Pink, or humpback.....			600	45	300	12	900	57
King, or spring.....			15,800	1,697	28,300	2,605	44,100	4,302
Red, or sockeye.....	8,800	666	291,150	23,267	644,300	42,871	944,250	66,804
Total.....	14,000	926	342,450	27,108	678,500	45,886	1,034,950	73,920

**FRESH SALMON**

Of the 12 operators in southeast Alaska who reported the production of fresh salmon, 2 were engaged primarily in that business and gave employment to 4 white shoresmen. The operations of the others were mainly incidental to the mild curing of salmon and to the halibut fishery. The output consisted of 526,153 pounds of kings valued at \$29,722 and 33,134 pounds of cohos valued at \$879, a total of 559,287 pounds valued at \$30,601, against 1,095,913 pounds valued at \$70,574 in 1932—a decrease of approximately 49 percent in quantity and 57 percent in value.

The foregoing figures are exclusive of the fresh salmon sold to halibut boats for bait, which is shown under miscellaneous salmon products.

#### FREEZING

Operations in the salmon freezing business in 1933 were carried on only in southeastern Alaska and were largely incidental to other lines of the fishery industry. One cold-storage plant whose chief output was frozen salmon gave employment to 20 white shoresmen. The total output of frozen salmon was 4,236,252 pounds, valued at \$221,382, a decrease of 31 percent in quantity and 2 percent in value from the previous year, when 6,116,921 pounds valued at \$226,204 were prepared.

#### *Products of the frozen-salmon industry in 1933*

Species	Pounds	Value	Species	Pounds	Value
Coho, or silver.....	2, 749, 987	\$127, 782	Red, or sockeye.....	1, 300	\$124
Chum, or keta.....	179, 373	2, 735	Total.....	4, 236, 252	221, 382
Pink, or humpback.....	2, 574	133			
King, or spring.....	1, 303, 018	90, 608			

#### DRY-SALTED, DRIED, AND OTHER MISCELLANEOUS SALMON PRODUCTS

A small quantity of canned smoked salmon was again prepared in southeast and central Alaska, and some dried salmon also was produced in the latter district, where employment was given to five white fishermen. Operators in these districts reported the sale of a limited number of salmon to halibut boats for bait. A small output of dry-salted salmon and dried salmon was produced in the Bristol Bay area in connection with salmon-pickling operations.

In the fishery of the Yukon, Tanana, and Kuskokwim Rivers, which is carried on chiefly by natives, 1,348,000 pounds of chum salmon were dried, valued at \$53,840, and 528 pounds of kings were smoked and canned, valued at \$75. In this region 12 whites and 600 natives engaged in the fishery, and the apparatus used consisted of 278 wheels, 622 gill nets of 8,763 fathoms, and 50 rowboats and skiffs.

#### BYPRODUCTS

Salmon byproducts were prepared by one plant in southeast Alaska, which employed 15 white shoresmen, and by 1 salmon cannery in the central district in connection with its canning operations. The total production was 913,358 pounds of fertilizer, valued at \$14,679, and 35,700 gallons of oil, valued at \$5,748, as compared with 847,285 pounds of fertilizer, valued at \$11,060, and 39,821 gallons of oil, valued at \$5,770, in 1932—an increase of about 8 percent in the amount of fertilizer and a decrease of 10 percent in the output of oil.

*Production of dry-salted, dried, and other miscellaneous salmon products in Alaska in 1933*

Species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Dry-salted: Red, or sockeye.....					15, 107	\$300	15, 107	\$300
Dried:								
Coho, or silver.....			1, 800	\$36			1, 800	36
Chum, or keta.....			4, 425	101	1, 348, 000	53, 840	1, 352, 425	53, 941
Pink, or humpback.....			25, 200	504			25, 200	504
Red, or sockeye.....					5, 000	500	5, 000	500
Total.....			31, 425	641	1, 353, 000	54, 340	1, 384, 425	54, 981
Smoked and canned:								
King, or spring.....	3, 360	\$520	7, 032	2, 278	528	75	10, 920	2, 873
Red, or sockeye.....			1, 968	369			1, 968	369
Total.....	3, 360	520	9, 000	2, 647	528	75	12, 888	3, 242
Fresh, for bait:								
Coho, or silver.....	200	2					200	2
Chum, or keta.....	23, 100	100					23, 100	100
Pink, or humpback.....	25, 400	175	15, 300	100			40, 700	275
Total.....	48, 700	277	15, 300	100			64, 000	377
Grand total.....	52, 060	797	55, 725	3, 388	1, 368, 635	54, 715	1, 476, 420	58, 900

### HERRING

Notwithstanding the continued low prices that prevailed throughout the season, particularly on Scotch-cured herring, the total yield of herring products showed a substantial gain over that of the previous year, due primarily to the increased production of herring meal and oil. The Scotch-cured product was slightly less than in 1932, but there was a fair output of Norwegian-cured herring, which more than made up the difference. A sharp decline occurred in the amount of herring sold to halibut boats for bait, and the shortage in this commodity strengthened the price to a considerable extent.

Although the output of Scotch-cured herring in the Kodiak area dropped from 5,411,400 pounds in 1932 to 4,130,875 pounds in 1933, that area again yielded the largest output of any Alaska district. Southeast Alaska held second place, with an output of 3,874,703 pounds, as compared with 2,680,825 pounds in 1932. The Scotch-cured herring output in Prince William Sound increased from 2,930,750 pounds in 1932 to 3,046,125 pounds in 1933, and in the Aleutian Islands area from 1,551,250 pounds to 1,589,250 pounds. Small quantities of cured herring also were prepared at Chignik and Golovin Bay. No production has been reported from Cook Inlet since 1928.

It was said that much larger catches of herring might have been taken in the Kodiak area if the operators had gone into Shelikof Strait for the fish instead of waiting for them to come into Malina Bay. The operation of 12 or more purse seine boats in outer Malina Bay probably broke up the schools and hindered them from entering Malina Bay.

In the Aleutian Islands area large schools of herring appeared early in June, and the first commercial catches were made July 3, a week earlier than in the previous year. The first fish were of better quality than the later run, which is unusual.

In southeast Alaska 19 concerns handled herring in 1933, as compared with 18 in the previous year. Of these, 5 were cold-storage plants handling frozen herring for bait, and 7 operated pounds to provide fresh bait herring to the halibut fleet. Six concerns engaged in the saltery and reduction business as follows:

Arentsen & Co.....	Big Port Walter.
Buchan & Heinen Packing Co.....	Port Armstrong.
Chatham Strait Fish Co.....	New Port Walter.
Northwestern Herring Co.....	Port Conclusion.
Port Herbert Packing Co., Inc.....	Port Herbert.
Storfold & Grondahl Packing Co.....	Washington Bay.

Sixteen concerns engaged in the herring fishery in central Alaska, all of whom prepared pickled herring, while 3 also produced meal and oil, and 1 a fair quantity of bait herring. The more important operators in the district were as follows:

Salteries:

Alaska Fisheries Co. (floating).....	Kodiak.
Apex Fish Co.....	Iron Creek.
Blue Island Packing Co.....	Blue Fox Bay.
Buchan & Heinen Packing Co.....	Kodiak.
David Buvick.....	Shuyak Strait.
Jacobson Bros.....	Iron Creek and Prince William Sound.
Johnson Fisheries Co.....	Thumb Bay and Port Williams.
Oceanic Fisheries, Inc. (floating).....	Kodiak Island and Prince William Sound.
San Marco Fish Co. (floating).....	Kodiak Island.
Sword & Hofstad (floating).....	Do.
United Alaska Herring Co. (floating).....	Do.
Saltery and reduction plants:	
Chatham Strait Fish Co.....	Crab Bay.
Evans Bay Packing Co.....	Port Benny.
Siberian Fish & Cold Storage Co.....	Port Ashton.

The chief operators in the western district were the following, all of whom produced Scotch-cured or Norwegian-cured herring:

Austnes & Rod.....	Unalaska.
Campbell & Dougal.....	Dutch Harbor.
Ed Jacobsen & Co.....	Do.
Northwestern Herring Co.....	Do.
Olsen & Kangas.....	Do.
Peterson & Jorgensen.....	Do.
Polar Packing Co.....	Unalaska.
John A. Rockas.....	Dutch Harbor.

Biological studies of the Alaska herring were continued by Dr. George A. Rounsefell, assisted by Edwin H. Dahlgren, in southeast Alaska.

#### STATISTICAL SUMMARY

Nine hundred and eighty-eight persons engaged in the herring industry in 1933, as compared with 819 in 1932. The number of plants increased from 27 to 31. Products of the fishery were valued

at \$1,402,194, an increase of \$229,036, or approximately 20 percent over 1932, when the total value was \$1,173,158. Scotch-cured herring decreased from 12,793,225 pounds, valued at \$618,880, in 1932, to 12,651,328 pounds, valued at \$586,331, or about 1 percent in quantity and 5 percent in value. Herring for bait decreased from 6,486,815 pounds, valued at \$47,942, to 4,471,890 pounds, valued at \$38,509, or 31 percent in quantity and 20 percent in value. Meal increased about 15 percent in quantity and 52 percent in value, and oil increased 24 percent in quantity and 54 percent in value.

*Persons engaged, wages paid, and operating units, Alaska herring industry, 1933*

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
<b>PERSONS ENGAGED</b>				
Fishermen:				
Whites.....	230	126	25	381
Natives.....	1	13	11	25
Total.....	231	139	36	406
Shoresmen:				
Whites.....	212	259	27	498
Natives.....		11	37	48
Chinese.....		1		1
Japanese.....		2		2
Total.....	212	273	64	549
Transporters:				
Whites.....		21	8	29
Natives.....			4	4
Total.....		21	12	33
Grand total.....	443	433	112	988
Wages paid shoresmen.....	\$79, 123	\$71, 879	\$12, 469	\$163, 471
Wages paid transporters.....		\$6, 741	\$1, 638	\$8, 379
<b>OPERATING UNITS</b>				
Plants:				
Shore.....	6	11	8	25
Floating:				
Power vessel.....		1		1
Net tonnage.....		1, 597		1, 597
Sailing vessels.....		1	1	2
Net tonnage.....		1, 068	328	1, 396
Scows.....		3		3
Total plants operated.....	6	16	9	31
Vessels:				
Power, over 5 tons.....	35	24	3	62
Net tonnage.....	1, 116	653	104	1, 873
Launches.....	2	3	3	8
Power dories.....			3	3
Gill-net boats.....			12	12
Seine skiffs.....	23	19		42
Other rowboats and skiffs.....	20	17	1	38
Lighters and scows.....	2	1		3
Pile drivers.....	1	1		2
Apparatus:				
Purse seines.....	36	20		56
Fathoms.....	5, 922	3, 163		9, 085
Gill nets.....		1	63	64
Fathoms.....		40	2, 206	2, 246
Pound seines.....	8	8		16
Pounds.....	4	12		16

*Products of Alaska herring industry in 1933*

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Fresh, for bait.....	2, 413, 220	\$21, 232	562, 300	\$5, 014	-----	-----	2, 975, 520	\$26, 246
Frozen, for bait.....	1, 496, 370	12, 263	-----	-----	-----	-----	1, 496, 370	12, 263
Pickled, for food:								
Scotch cure.....	3, 874, 703	174, 284	7, 177, 000	338, 065	1, 599, 625	\$73, 982	12, 651, 328	586, 331
Norwegian cure.....	31, 250	1, 750	6, 000	450	253, 700	11, 819	290, 950	14, 019
Roused for food (bloater stock).....	-----	-----	-----	-----	509, 790	17, 474	509, 790	17, 474
Spiced.....	1, 000	125	-----	-----	-----	-----	1, 000	125
Dry salted.....	-----	-----	-----	-----	54, 200	2, 020	54, 200	2, 020
Meal.....	17, 534, 860	277, 611	4, 496, 000	71, 911	-----	-----	22, 030, 860	349, 522
Oil.....	18, 821, 798	318, 797	4, 464, 360	75, 397	-----	-----	23, 286, 158	394, 194
Total.....	44, 173, 201	806, 062	16, 705, 660	490, 837	2, 417, 315	105, 295	63, 296, 176	1, 402, 194

<sup>1</sup> 2,509,573 gallons.<sup>2</sup> 595,248 gallons.<sup>3</sup> 3,104,821 gallons.**HALIBUT**

The cooperation of a majority of the American fleet in a program for the control of production during a large part of the season was of material benefit to the halibut industry. Under this program, catch limits per man were prescribed for vessels operating in the different areas, and the vessels were assigned dates on which to make port with their fares. This resulted in shorter trips, an excellent quality of fish, and a more even distribution of the market supply, eliminating to a large extent the overconcentration of stocks so frequently brought about by unrestricted fishing. These factors had a direct influence on prices, which averaged for the year approximately 40 percent higher than for 1932.

The fishermen gave greater attention than in 1932 to the saving of halibut livers, resulting in a substantial increase in the quantity sold and a larger profit to the fishermen, inasmuch as the prices advanced about 25 percent. It is estimated that for each 65 pounds of halibut landed there is landed about 1 pound of halibut liver.

In accordance with amended regulations of the International Fisheries Commission, the halibut-fishing season opened on February 1. As in the preceding year, halibut were abundant on the fishing grounds. The catch limit for area no. 2 was reached in August, and the season was closed there on August 25; area no. 3, to the westward, remained open through October 26.

Biological and statistical studies of the Pacific halibut were continued by the International Fisheries Commission under the direction of Dr. William F. Thompson. The schooner *Eagle* was chartered for field work and was operated in the Gulf of Alaska for about 10 weeks at the beginning of the year. The Canadian schooner *Capella I* was used also by the commission for investigational work in the vicinity of Queen Charlotte Islands.

**STATISTICAL SUMMARY**

There were 569 persons engaged in the halibut industry in Alaska in 1933—an increase of 110 from the number reported for the preceding year, and the products totaled 14,068,911 pounds, valued at

\$726,362. This output represents the total fares of the Alaska halibut fleet, which comprises all American vessels landing more than one-half of their catch in Alaska or British Columbia ports rather than in the States. Landings of halibut in Alaska totaled 6,779,768 pounds, valued at \$316,310. In 1932 the landings of the Alaska fleet were 13,552,296 pounds, valued at \$493,052, while landings in Alaska totaled 4,562,988 pounds, valued at \$134,652. Thus the increase in fares of the Alaska fleet was 516,615 pounds, or approximately 4 percent in quantity and 47 percent in value, while landings at Alaska ports increased 2,216,780 pounds, or about 49 percent in quantity and 135 percent in value over the preceding year.

These statistics were compiled from data collected by the International Fisheries Commission and by Bureau agents.

*Persons engaged, wages paid, and operating units, Alaska halibut industry, 1933*

Items	Total	Items	Total
PERSONS ENGAGED		OPERATING UNITS	
Fishermen: Whites.....	518	Vessels:	
Shoresmen:		Power, over 5 tons.....	86
Whites.....	48	Net tonnage.....	1,578
Natives.....	3	Launches.....	27
Total.....	51	Dories.....	86
Grand total.....	569	Skates of lines.....	2,341
Wages paid shoresmen.....	\$15,698		

*Products of the Alaska halibut fishery in 1933*

Products	Southeast Alaska		Central Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fresh (including local).....	8,260,476	\$415,833	22,061	\$1,790	8,282,537	\$417,623
Frozen.....	5,786,374	308,739			5,786,374	308,739
Total.....	14,046,850	724,572	22,061	1,790	14,068,911	726,362

**COD**

Operations in the cod industry in Alaska in 1933 showed a marked increase as compared with the previous year. Twenty-eight whites and 7 natives were reported engaged in the fishery carried on from shore stations, a gain of 11 over the number employed in 1932. These fishermen operated chiefly in the Shumagin Islands region and in the vicinity of Unalaska. Products of the shore fishery were as follows: 82,430 pounds of dry-salted cod, valued at \$2,417; 224,425 pounds of pickled cod, valued at \$7,365; 31,220 pounds of stockfish, valued at \$3,085; and 400 pounds of tongues, valued at \$40—a total of 338,475 pounds, valued at \$12,907, as compared with 197,263 pounds, valued at \$5,583, in 1932.

Five vessels, the same number as in 1932, comprised the Bering Sea offshore fleet, the products of which are not included with the Alaska fisheries output because the vessels operate from and land

their fares in ports of the Pacific Coast States. Of these vessels, the *Sophie Christenson* (570 tons) was operated by the Pacific Coast Codfish Co.; the *Wawona* (413 tons) and the *Azalea* (365 tons) by the Robinson Fisheries Co.; and the *Louise* (328 tons) and *William H. Smith* (496 tons) by the Union Fish Co. This is the first time since 1930 that the *Azalea* engaged in the Bering Sea cod fishery. The Union Fish Co.'s vessel *Beulah* was not operated in Alaska this year. Products of the offshore fishery were 4,860,069 pounds of dry-salted cod, valued at \$163,961, and 30,400 pounds of tongues, valued at \$2,640—a total of 4,890,469 pounds, valued at \$166,601, as compared with 3,645,655 pounds, valued at \$127,458, in 1932. The offshore fishery employed 196 persons, or 61 more than in the previous year.

#### WHALES

The Port Hobron plant of the American Pacific Whaling Co. was again the only whaling station operated in Alaska. Three steam whalers were used, and employment was given to 89 whites, 15 natives, and 1 Japanese. The number of whales taken was 182, consisting of 61 finbacks, 114 humpbacks, 3 sperm, 1 sulphur-bottom, 1 right, and 2 California gray whales.

The products of the whale fishery were 301,350 gallons of whale oil, valued at \$53,066; 11,200 gallons of sperm oil, valued at \$2,150; 310 tons of fertilizer from meat, valued at \$9,320; and 207 tons of bone fertilizer valued at \$4,453—a total value of products of \$68,989, as compared with \$91,133 in 1932.

#### CLAMS

An outstanding feature of the clam industry in Alaska in 1933 was the increased importance of the Cook Inlet area as a producing center, the pack from that district representing approximately 42 percent of the total output. About 55 percent of the clam products came from the Prince William Sound district, and the remaining 3 percent from the Kodiak area and southeast Alaska.

The sharp decline in the total output as compared with that for the previous year may be attributed partly to the 3-weeks strike of the clam diggers in the Cordova region in May, and partly to the fact that two of the larger plants—that at Kukak Bay, operated in 1932 by the Pioneer Packing Co., and the plant of the Strand-Jensen Fisheries Co. at Cordova—were closed in 1933.

Employment was given to 687 persons, of whom 611 were whites, 69 natives, 6 Filipinos, and 1 Japanese. The output consisted of 40,414 cases, containing 1,045,800 pounds (1,041,816 pounds of razor clams, and 3,984 pounds of butter clams), and 50 dozen clams in the shell, with a total value of \$246,338. Of the canned product, 583,770 pounds were from the vicinity of Cordova, 435,294 pounds from Cook Inlet, 22,752 pounds from the Kodiak district, and 3,984 pounds from southeast Alaska. The total output shows a decrease of 40 percent in quantity and 45 percent in value from that for 1932, when clam products amounted to 1,757,016 pounds, valued at \$447,368.



*Products of the Alaska clam industry in 1933*

Item	Cases	Pounds	Value
<b>Mined:</b>			
½-pound cans (48 to case).....	28, 875	693, 000	\$173, 238
10-ounce cans (48 to case).....	10, 838	325, 140	68, 327
1-pound cans (48 to case).....	25	1, 200	200
20-ounce cans (24 to case).....	100	3, 000	570
<b>Whole:</b>			
½-pound cans (48 to case).....	116	2, 784	540
10-ounce cans (48 to case).....	78	2, 340	667
1-pound cans (48 to case).....	382	18, 336	2, 771
Total.....	40, 414	1, 045, 800	246, 313
Fresh, in shell: 50 dozen.....		120	25
Grand total.....		1, 045, 920	246, 338

**SHRIMP**

Three companies in southeast Alaska—the Alaskan Glacier Sea Food Co. at Petersburg, and the Reliance Shrimp Co. and Stikine Sea Food Co. at Wrangell—engaged in the shrimp industry in 1933, and in the central district the Northern Seafood Co. at Cordova again prepared a limited quantity of shrimp meat in connection with its crab fishery operations.

The number of persons employed in the industry was 139, of whom 19 were whites, 89 natives, 1 Chinese, 21 Japanese, 7 Filipinos, and 2 Mexicans. Products consisted of 317,012 pounds of shrimp meat, valued at \$102,101, and 2,040 pounds of fresh shrimp in shell, valued at \$281, a total of 319,052 pounds, valued at \$102,382. Comparable figures for 1932 show a production of 301,786 pounds, valued at \$114,136.

**CRABS**

Operations in the crab fishery, particularly with respect to the production of canned crabs, showed a marked expansion as compared with other recent years. Four concerns engaged in the industry in southeast Alaska—the Alaska Fisheries, Inc., a new outfit, at Hood Bay; the Northern Sea Food Co., at Petersburg; the Stikine Sea Food Co., primarily in the shrimp business, at Wrangell; and O. H. Wood, at Hoonah. In the central district, also, there were four operators—the Alaska Sea Products, Inc., the Gulf Packing Co., and the Northern Sea Food Co., at Cordova; and S. E. Smith, at Hartney Point, whose production of crabs was incidental to the clam industry.

Employment was given to 85 whites, 19 natives, and 1 Mexican. Products consisted of 90,360 pounds of cold-packed meat, valued at \$19,634; 1,863 dozen crabs in the shell, valued at \$1,616; and 421,536 pounds canned (1,450 cases of 1-pound cans and 14,664 cases of ½-pound cans, 48 cans to the case), valued at \$134,330. The total value of products in 1933 was \$155,580, as compared with \$90,954 in 1932, an increase of 71 percent.

## JAPANESE VESSELS IN BERING SEA

Operations of Japanese floating crab canneries in Bering Sea, which have been carried on there for four successive seasons, were on a somewhat larger scale in 1933 than in the previous year. About the middle of May the cannery vessels *Shoheo Maru* and *Taihoku Maru* were observed with their tenders and small fishing boats operating offshore from Amak Island and Nelson Lagoon, respectively. Later they moved farther east to the vicinity of Cape Seniavin. In June the floating cannery *Kasada Maru* was seen fishing to the north of Nelson Lagoon, and in the early part of August the *Shinano Maru*, with the trawler *Kokusai Maru*, was anchored about 11 miles northeast of St. Paul Island, its crab nets covering a wide area. All the nets used by the Japanese fishermen were set well outside of the 3-mile limit.

In addition to the floating canneries, the scouting ship *Hakuho Maru*, of the Department of Agriculture and Forestry, made a cruise along the Aleutian Islands in June for the purpose of investigating the migration route of fur seals. It left Dutch Harbor on June 26 to return to Japan.

The Japanese Government vessel *Hakuyo Maru*, of the Imperial Fisheries Institute of Tokyo, was also in Bering Sea. Besides the crew of 44 men and 15 officers, there were 32 graduating seniors aboard. The vessel is equipped with means to can fish, and it was said that the students had canned some salmon during the cruise. On August 4 the *Hakuyo Maru* anchored off East Landing, St. Paul Island; and the captain and a party of students went ashore and visited the Reef fur-seal rookeries. The vessel stopped at Dutch Harbor the following day and departed on August 9.

## TROUT

The production of trout was on a limited scale and was incidental to other branches of the fishery. The products were as follows. Dolly Vardens, 29,322 pounds fresh, valued at \$1,497; 265 pounds frozen, valued at \$14; and 1,500 pounds dried, valued at \$30; steel-heads, 9,268 pounds frozen, valued at \$424. The total output of both species was 40,355 pounds valued at \$1,965, as compared with 12,346 pounds valued at \$942 in 1932.

## MISCELLANEOUS FISHERY PRODUCTS

Several species of fish of minor commercial importance are taken in small quantities, chiefly in connection with the halibut fishery, and are landed at ports of Alaska and British Columbia and at Seattle. Such products landed in Alaska in 1933 were as follows: Sablefish, 8,990 pounds fresh, valued at \$271; 92,705 pounds frozen, valued at \$4,134; and 1,400 pounds pickled, valued at \$100; rockfish, 428 pounds fresh, valued at \$10, and 3,105 pounds frozen, valued at \$109; flounders, 75,000 pounds fresh, valued at \$1,125; and smelt, 500 pounds fresh, valued at \$50.

## FUR-SEAL INDUSTRY

### PRIBILOF ISLANDS

#### GENERAL ADMINISTRATIVE WORK

Sealing activities at the Pribilof Islands in 1933 resulted in the taking of 54,550 skins, of which 44,448 were obtained on St. Paul Island and 10,102 on St. George Island. On St. Paul Island 35,746 sealskins were blubbered in the course of curing operations. Three-year-old males constitute the class of animals from which the bulk of the killings were made, a sufficient number being reserved to maintain the breeding quota in subsequent years.

Incidental to the sealing activities were the care of the natives living on the islands as wards of the Government, the upkeep and improvement of the villages and of the central plants for curing and packing sealskins, the construction of roads to facilitate delivery of skins from the rookeries to the plants, and the utilization and care of foxes and reindeer, which occupy positions of importance in the economic development of the islands.

Transportation of the annual shipment of supplies to the Pribilofs and of sealskins to Seattle was accomplished through the cooperation of the Navy Department in the detail of the U.S.S. *Vega* for this work. Additional transportation of incoming and outgoing passengers and freight was furnished by the Bureau's motor vessel *Penguin* on several voyages to and from Seattle.

A regular patrol of the North Pacific Ocean and Bering Sea during the migration of the seals and their sojourn in these waters was maintained by vessels of the United States Coast Guard. Other services also were rendered by these vessels in connection with the Bureau's work at the Pribilof Islands.

For the first time since the treaty of July 7, 1911, for the preservation of fur seals in the North Pacific Ocean became effective, Great Britain in 1933 elected to take delivery of its share of the sealskins taken on the Pribilof Islands. Accordingly, these skins were delivered to a representative of the Canadian Government at Seattle in August. Heretofore that Government has accepted 15 percent of the net proceeds of sale in lieu of a share of the skins.

Two public auction sales of sealskins were held at St. Louis, Mo. in 1933. All the skins sold had been taken in prior years, and 15 percent of the net proceeds was paid to each of the Governments of the Dominion of Canada and of Japan, as provided by law. In December the United States received from Japan 170 sealskins as its share of the killings from the Japanese seal herd on Robben Island in 1933.

#### TRANSPORTATION OF SUPPLIES

On July 24 the U.S.S. *Vega* sailed from Seattle, Wash., for the Pribilof Islands with 1,069 tons of general supplies, 1,304 tons of coal, 139,306 board feet of lumber, and 110 bundles of shingles. The vessel arrived at the islands on August 1, and the discharge of cargo and the loading of the season's take of sealskins were completed in 10 days. In addition to 54,550 fur-seal skins, the

outgoing cargo included a few tons of miscellaneous items. The *Vega* left for Seattle on August 11 and arrived there on August 20.

The Bureau's vessel *Penguin* delivered five minor shipments of supplies to the Pribilof Islands during the year.

#### POWER VESSEL "PENGUIN"

At the beginning of the year the *Penguin* was en route from Seattle to the Pribilof Islands with a full cargo of supplies, which was discharged early in January. During the next 2 months the vessel served as a tender between Unalaska and the islands, chiefly in the delivery of mail and perishable foodstuffs. On March 10 it sailed for Seattle with 8 passengers, 26 cases of fox skins, and 119 empty oil drums, and arrived there on March 22.

The *Penguin* left Seattle on April 20 with a full cargo of freight and arrived at St. Paul Island on May 3. The return voyage to Seattle began on May 24 and ended on June 2. On its next trip to the Pribilofs, from June 10 to June 20, the vessel had 26 passengers aboard and carried 165 tons of supplies in the hold and 2 power launches on deck. The return trip to Seattle covered the period from July 30 to August 10, a call being made en route at Afognak, where six Bureau employees from the fish-cultural station were taken aboard. Twenty-one passengers for the Bureau from the Pribilofs, of whom 17 were employees of the Fouke Fur Co. who had gone there in June as sealing assistants, were returned to Seattle at this time.

While the *Penguin* was proceeding through Seymour Narrows on August 8 against a strong tide, the steering gear gave way, leaving the vessel at the mercy of the tidal currents. Fortunately, the halibut fishing boat *Bernice*, of Seattle, northbound through the Narrows, answered the call for assistance and rendered valuable aid in towing the disabled craft to a safe anchorage in Deepwater Bay, where temporary repairs were made, permitting the *Penguin* to resume its voyage to Seattle. After permanent repairs of the steering gear were completed, the vessel sailed on August 23 for the Pribilof Islands with nine passengers and miscellaneous cargo, and arrived there on September 5.

Nine Bureau employees and a small lot of freight were aboard the *Penguin* when it left the islands on September 11, and additional employees were picked up en route south as follows: 1 at Unalaska, 2 at Chignik, and 3 at Kodiak. An employee of the United States Coast Guard Service was added to the passenger list at Ketchikan.

While running cautiously on her course through thick weather, the *Penguin* collided with the gas boat *Tuscan*, 18 tons net, plying between Ketchikan and Hyder under a mail contract, at 3:40 a.m. September 21, near Bold Island in Revillagigedo Channel, about 12 miles southeast of Ketchikan, damaging the starboard quarter of the *Tuscan*. The disabled boat was towed to Ketchikan by the *Penguin*, and a report of the accident was made to the local customs officials. Thereafter the voyage was continued, and the vessel arrived at Seattle on September 25. Subsequently a libel suit was filed by the owners of the *Tuscan* in the United States District Court at Ketchikan, claiming damages to the vessel, salvage charges, and loss of her next mail

trip, amounting to \$6,800. The case was tried in March 1934, and was dismissed, as negligence on the part of the *Penguin* was not shown.

The final cargo of the year for the Pribilof Islands was shipped on the *Penguin* from Seattle on October 10 and reached its destination on October 25. On the return voyage, which began October 30 and ended November 11, 12 passengers from the islands and 2 Bureau employees from Karluk were brought to Seattle.

At various times during the year the *Penguin* was used in the transportation of natives from villages on the Alaska Peninsula and the Aleutian Islands who were employed as laborers in the sealing activities of the Bureau. In July, it transported Commissioner Bell and his party of five from Bristol Bay to St. Paul Island and thence to Unalaska. Additional service was performed for the Navy Department in the movement of employees and small lots of supplies to the islands.

The *Penguin* was also used on February 14 to rescue Bishop Antonin, of the Russian Greek Orthodox Church in Alaska, who was a survivor of the wreck of the *Umnak Native* in Inanudak Bay, Umnak Island, on January 24, when 11 lives were lost.

The cruises of the *Penguin* in 1933 aggregated 27,882 nautical miles.

#### ROADS

*St. Paul Island*.—Road construction work was continued in 1933 by an extension of  $1\frac{1}{8}$  miles to the Northeast Point highway, including turn-cuts for passing and branches to Lukanin and Kitovi rookeries. A good road to Zapadni, much needed because of the larger number of sealskins now being taken at that point, was commenced and more than 7,000 feet was completed. Further construction will be pushed as rapidly as conditions permit. Roads in the village to the extent of 1,200 feet were also reconditioned.

*St. George Island*.—Part of the plank road to North rookery was surfaced with scoria, and roads east and west of the village were improved in like manner. Grading of the east road for an additional 1,000 feet was carried on and is now in condition for scoria, the most serviceable material on the island for road building. A new approach to the village dock also was graded and surfaced, thus greatly facilitating the handling of cargo between the dock and the warehouses.

#### BUILDINGS

*St. Paul Island*.—The dock at the west landing, 80 by 100 feet, was completed, which, with the dock at the east landing, makes possible the discharging of cargo at any stage of the tide without interruption, except by high winds, and constitutes a major improvement in providing adequate dockage for scows used in the transfer of freight from and to the supply vessels. Boatways at the east landing were also built this year.

Cement foundations for 3 dwellings for natives were constructed, and the bunk house for blubberers, comprising an assembly room, bedrooms for 36 men, 6 shower baths and toilets, and equipped with a hot-water heating plant, was completed early in the season.

Increased facilities for the cooling of sealskins were provided in washhouse B by the installation of 10 new tanks, leaving space for 5 additional tanks to be supplied as required. The present equipment consists of 12 tanks, 2 of which are old, the combined capacity affording cooling space for 6,700 skins at one time.

A cement floor, 54 by 100 feet, was laid in the garage, and electrical equipment was improved by the installation of a 5-kw unit to replace the worn-out Edison batteries.

*St. George Island.*—A cement foundation and basement framework for a new schoolhouse were constructed early in the season, but lack of material prevented completion of the building this year.

The watchmen's house at Zapadni was replaced with a new building, which also provides housing for the men who may be engaged annually in sealing and foxing activities at that point.

The water supply of the village, being inadequate for the needs of the community, was augmented by the addition of a 40,000-gallon tank built out of staves salvaged from several tanks that collapsed on St. Paul Island years ago.

New electrical equipment was provided by the purchase and installation of a 2-kw automatic unit and a 12-kw manual controlled unit. The smaller unit supplies current for the lighting of the dwellings of the white personnel on the island, while the larger unit produces enough current to light all the houses of the natives.

#### NATIVES

##### CENSUS

On December 31, 1933, the total native population on St. Paul Island was 242, including 12 persons temporarily absent from the island, of whom 5 were on St. George Island, 1 in Seattle, and 6 in Unalaska. Births numbered 15, deaths 3, and permanent departures 3, leaving a net increase in population of 9.

On the same date, the census of St. George Island showed a population of 157 natives, including one who was temporarily residing elsewhere. The net increase for the year was 4, there being 8 births and 4 deaths in 1933.

The total population on both islands at the end of 1933 was 399, an increase of 13 over the total for 1932.

##### MEDICAL SERVICE

The Pribilof Islands were provided with medical service by the employment of two physicians, one for each island. Dental service was also given to the natives for the greater part of the year, but due to a shortage of funds the dentists had to be released, although much remained to be done. Aside from ailments caused by poor teeth, the health of the natives and the sanitary conditions on both islands were good.

##### SCHOOLS

Due to the untimely resignation on September 10, 1932, of the school-teachers on St. Paul Island, school was not opened until other teachers reached the island on January 7, 1933. It was closed

on May 12, after a term of 4 months. The enrollment in the junior school was 15 boys and 18 girls, and in the senior school 16 boys and 13 girls, the total for both schools being 62, or approximately one-fourth of the native population of the island.

The school year on St. George Island opened September 19, 1932, and closed May 11, 1933, the opening date having been delayed 2 weeks by an epidemic of influenza which occurred in the early part of September. Ten boys and 11 girls attended the senior school, and 10 boys and 8 girls were enrolled in the junior school, a total of 39 children in both branches of the school, or 25 percent of the entire native population.

## SAVINGS ACCOUNTS

The Commissioner of Fisheries is the custodian of certain savings of Pribilof Islands natives, which accounts are held in the bank of the Washington Loan & Trust Co., Washington, D.C. Interest is paid on these savings at the rate of 3 percent, compounded semi-annually. Four accounts were closed and one was transferred this year. The following statement shows in the aggregate the condition of these accounts on December 31, 1933:

On hand Jan. 1, 1933-----	\$6,915.22
Interest earned from Jan. 1 to Dec. 31, 1933-----	186.73
	<hr/>
	7,101.95
Withdrawn by natives-----	980.22
	<hr/>
On hand Dec. 31, 1933-----	6,121.73

The following statement shows the amount of money in the individual accounts:

*Funds of the Pribilof Islands natives in the custody of the United States Commissioner of Fisheries as trustee, Dec. 31, 1933*

Gromoff, Iuliania-----	\$370.56	Merculief, Elizabeth-----	\$66.64
Kochutin, Alexandra-----	2,876.15	Merculief, Erena-----	703.83
Kozloff, Marina-----	124.44	Merculief, George-----	101.54
Kozloff, Raisa-----	66.43	Merculief, Tatiana-----	633.36
Lestenkof, Michael-----	393.85	Pankoff, Agrippina-----	190.84
Merculief, Alexandra-----	115.62		
Merculief, Daniel-----	478.47	Total-----	6,121.73

## PAYMENTS FOR TAKING FUR-SEAL SKINS

The natives of the Pribilof Islands are divided into classes according to their ability to perform definite work in the killing and skinning of seals. Six classifications were made, 5 of men and 1 of boys, speed and skill in removing the skins being the determining factor in the personnel of each class. The most experienced and skillful workers were graded as first-class men, while those less experienced and skilled were placed in the lower classes. Boys were employed as apprentices. Advancement through the several grades is governed by the degree of proficiency attained in the specialized work each man is required to perform.

Payments were made at the rate of 50 cents per skin for the total number of skins taken in the season upon the allocation of a definite number of skins per man in each class. In 1933, St. Paul Island produced 44,448 skins and St. George Island 10,102 skins, resulting

in a monetary return of \$27,275 to the six classes of workmen. Additional compensation amounting to \$280 was paid to 4 foremen and 4 mess attendants, making a gross income to the natives of \$27,555 on account of sealing operations. The details of these payments are shown in the following table:

*Payments to Pribilof Islands natives for taking fur-seal skins, calendar year 1933*

Classification	St. Paul Island			St. George Island		
	Number of men	Share of each	Total	Number of men	Share of each	Total
First class.....	29	\$490.00	\$14,210.00	27	\$150.00	\$4,050.00
Second class.....	14	392.50	5,495.00	3	112.50	337.50
Third class.....	4	281.00	1,124.00	4	87.50	350.00
Fourth class.....	5	208.50	1,042.50	4	64.00	256.00
Fifth class.....	5	50.00	250.00	2	25.00	50.00
Boys' class.....	5	20.50	102.50	1	7.50	7.50
Foreman (additional compensation).....			60.00			55.00
Do.....			40.00			45.00
Mess attendants, 4.....			80.00			
Total.....	62		22,404.00	41		5,151.00

#### PAYMENTS FOR TAKING FOX SKINS

The trapping of foxes by 55 natives on St. Paul Island and 39 on St. George Island in the winter of 1932-33 resulted in the taking of 271 and 872 skins on the respective islands. The trappers were paid \$4.50 per skin, or a total of \$5,143.50.

#### FUR SEALS

##### KILLINGS

Forty-three drives of seals from the hauling grounds to the killing fields were made on St. Paul Island, from which 44,448 seals were killed. At the same time 35 drives on St. George Island produced 10,102 seals for killing. The following table gives the details of these operations.

*Seal killings on Pribilof Islands in 1933*

##### ST. PAUL ISLAND

Date	Serial no. of drive	Hauling ground	Skins secured
June 3	1	Sea Lion Rock (Sivutch).....	121
13	2	Reef and Gorbatch.....	278
17	3	Tolstoi.....	37
19	4	Zapadni and Little Zapadni.....	173
20	5	Polovina.....	62
21	6	Vostochni and Morjovi.....	491
22	7	Tolstoi and Lukanin.....	174
23	8	Zapadni and Little Zapadni.....	155
24	9	Reef and Gorbatch.....	1,338
25	10	Polovina and Little Polovina.....	132
26	11	Vostochni and Morjovi.....	981
27	12	Tolstoi, Lukanin, and Kitovi.....	227



*Seal killings on Pribilof Islands in 1933—Continued*

## ST. PAUL ISLAND—Continued

Date	Serial no. of drive	Hauling ground	Skins secured
June 28	13	Zapadni and Little Zapadni.....	484
29	14	Reef and Gorbach.....	1, 512
30	15	Polovina and Little Polovina.....	416
July 1	16	Vostochni and Morjovi.....	1, 790
2	17	Tolstoi, Lukanin, and Kitovi.....	441
3	18	Zapadni and Little Zapadni.....	1, 348
5	19	Polovina and Little Polovina.....	665
6	20	Reef and Gorbach.....	3, 543
7	21	Vostochni and Morjovi.....	1, 819
8	22	Tolstoi, Lukanin, and Kitovi.....	688
9	23	Zapadni and Little Zapadni.....	1, 995
10	24	Reef and Gorbach.....	2, 863
11	25	Polovina and Little Polovina.....	759
12	26	Vostochni and Morjovi.....	2, 591
13	27	Tolstoi, Lukanin, and Kitovi.....	539
14	28	Zapadni and Little Zapadni.....	1, 215
15	29	Reef and Gorbach.....	1, 915
16	30	Polovina and Little Polovina.....	644
17	31	Vostochni and Morjovi.....	2, 081
18	32	Tolstoi, Lukanin, and Kitovi.....	688
19	33	Zapadni and Little Zapadni.....	1, 196
20	34	Reef and Gorbach.....	1, 032
21	35	Tolstoi, Lukanin, Kitovi, Polovina, and Little Polovina.....	819
22	36	Vostochni and Morjovi.....	1, 172
23	37	Reef and Gorbach.....	1, 962
24	38	Zapadni, Little Zapadni, Tolstoi, Lukanin, and Kitovi.....	1, 080
25	39	Vostochni, Morjovi, Polovina, and Little Polovina.....	1, 219
26	40	Reef and Gorbach.....	1, 095
27	41	Zapadni, Little Zapadni, Tolstoi, Lukanin, and Kitovi.....	899
28	42	Vostochni, Morjovi, Polovina, and Little Polovina.....	816
29	43	Reef and Gorbach.....	993
Total.....			44, 448

## ST. GEORGE ISLAND

June 9	1	North.....	16
14	2	do.....	50
16	3	East.....	61
19	4	North.....	48
20	5	East.....	39
23	6	North and Staraya Artil.....	296
24	7	East.....	161
25	8	Zapadni.....	77
27	9	North and Staraya Artil.....	365
28	10	East.....	126
29	11	Zapadni.....	58
July 1	12	North and Staraya Artil.....	638
2	13	East.....	366
3	14	Zapadni.....	123
5	15	North and Staraya Artil.....	884
6	16	East.....	448
7	17	Zapadni.....	229
9	18	North and Staraya Artil.....	956
10	19	East.....	370
11	20	Zapadni.....	169
13	21	North and Staraya Artil.....	604
14	22	East.....	476
15	23	Zapadni.....	220
17	24	North and Staraya Artil.....	650
18	25	East.....	222
19	26	Zapadni.....	174
21	27	North and Staraya Artil.....	498
22	28	East.....	498
23	29	Zapadni.....	85
24	30	North and Staraya Artil.....	245
25	31	East.....	145
26	32	Zapadni.....	100
27	33	North and Staraya Artil.....	353
28	34	East.....	258
29	35	Zapadni.....	94
Total.....			10, 102

## AGE CLASSES

Seals are divided into age groups according to the length of body, it having been found by repeated tests that this is the most satisfactory method of fixing the age of the animals selected for killing. These lengths have been applied to seals ranging from 1 to 6 years of age, and they constitute the gage by which the age of all male seals killed in 1933 was determined. This standard of measurement is not inflexible, however, as seals do not grow at exactly the same rate, but the variation from the accepted length of a seal of a certain age is regarded as inconsequential. The limits of the various age classes are shown in the table following:

*Age classes of male seals, Pribilof Islands*

Age	Length	Age	Length
Yearlings.....	<i>Inches</i> Up to 36.75	4-year-olds.....	<i>Inches</i> 46 to 51.75
2-year-olds.....	37 to 40.75	5-year-olds.....	52 to 57.75
3-year-olds.....	41 to 45.75	6-year-olds.....	58 to 63.75

*Ages of seals killed on Pribilof Islands, calendar year 1933*

(On basis of classification shown in preceding table)

Age	St. Paul Island	St. George Island	Total	Age	St. Paul Island	St. George Island	Total
2-year-old males.....	912	189	1,101	Cows <sup>1</sup> .....	36	43	79
3-year-old males.....	43,158	9,539	52,747	Total.....	44,448	10,102	54,550
4-year-old males.....	342	281	623				

<sup>1</sup> Cows unavoidably and accidentally killed or found dead.

Some of the seals recorded in the above tabulation as 2-year-olds and 4-year-olds probably were 3-year-olds, as not all male seals of a given age fall within the length limits assigned for the males of that age. As far as possible, the killings in 1933 were confined to 3-year-old males.

## RESERVING OPERATIONS

No 3-year-old male seals were marked for the breeding reserve in 1933. It was evident at the close of the season that the number of adolescent males of this age class was ample to maintain in subsequent years the supply of bulls in sufficient strength to meet all breeding requirements of the herd.

## COMPUTATION OF FUR-SEAL HERD

Following the procedure of other years, Supt. H. J. Christoffers again computed the number of seals in the Pribilof Islands herd at the close of the killing season of 1933. The result of this computation shows that the herd now numbers 1,318,568 seals of all ages. This is an increase of 98,607, or 8.08 percent, over the number reported in 1932. A more detailed summation of the seal census is given else-

where in this document. The growth of the herd by component parts for 12 years is shown in the table below.

*General comparison of computations of the seal herd on the Pribilof Islands  
1922-33*

Classes	1922	1923	1924	1925	1926	1927
Harem bulls.....	3,562	3,412	3,516	3,526	4,034	4,643
Breeding cows.....	185,914	197,659	208,396	226,090	244,114	263,566
Surplus bulls.....	2,346	1,891	2,043	3,558	2,002	4,827
Idle bulls.....	508	312	390	311	423	972
6-year-old males.....	3,771	4,863	8,489	4,105	13,434	13,450
5-year-old males.....	6,080	10,612	5,132	16,792	16,812	16,073
4-year-old males.....	11,807	5,710	18,670	18,692	17,872	14,448
3-year-old males.....	7,459	22,786	21,551	21,185	17,189	9,730
2-year-old males.....	40,920	43,112	45,685	43,515	38,183	41,252
Yearling males.....	52,988	55,769	59,291	52,091	56,514	61,026
2-year-old cows.....	46,280	48,801	51,359	49,786	44,415	48,186
Yearling cows.....	57,413	60,422	64,240	57,309	62,175	67,131
Pups.....	185,914	197,659	208,396	226,090	244,114	263,566
Total.....	604,962	653,008	697,158	723,050	761,281	808,870

  

Classes	1928	1929	1930	1931	1932	1933
Harem bulls.....	6,050	7,187	8,312	9,233	10,088	10,213
Breeding cows.....	284,725	307,491	332,084	358,642	387,320	418,299
Surplus bulls.....	5,285	5,207	3,963	3,291	2,893	4,700
Idle bulls.....	1,449	1,633	1,899	1,888	2,349	2,341
6-year-old males.....	12,857	10,399	5,612	6,553	8,154	9,335
5-year-old males.....	13,001	7,016	8,191	10,193	11,669	10,216
4-year-old males.....	7,798	9,102	11,327	12,966	11,351	15,441
3-year-old males.....	11,133	13,639	14,871	13,198	17,849	18,216
2-year-old males.....	49,087	64,354	69,674	74,828	81,101	87,662
Yearling males.....	65,861	85,381	92,232	99,612	107,592	116,195
2-year-old cows.....	57,061	67,210	72,605	78,410	84,682	91,454
Yearling cows.....	72,481	85,417	92,247	99,626	107,593	116,197
Pups.....	284,725	307,491	332,084	358,642	387,320	418,299
Total.....	871,513	971,527	1,045,101	1,127,082	1,219,961	1,318,568

#### FOXES

St. Paul and St. George Islands are inhabited by sizable herds of blue foxes which produce annually several hundred pelts. The care of these animals in the winter months when it is not easy for them to find natural food is one of the important activities of the islands at that season, as the feeding of prepared rations must be carried on to keep the foxes in prime condition for both trapping and breeding.

#### TRAPPING SEASON OF 1933-34

In the 1933-34 season there were taken 939 fox pelts, of which 914 were blue and 25 white. Two hundred and fourteen blue and 23 white pelts were taken on St. Paul Island, and 700 blue and 2 white pelts on St. George Island. There were also trapped, marked, and released for breeding stock 35 foxes on St. Paul Island and 192 on St. George Island. The breeding reserve includes also a considerable number of animals that were not captured during the season.

#### REINDEER

*St. Paul Island.*—On September 30, 1933, the reindeer herd on St. Paul Island numbered 673 animals, including the natural increase of

125 since the census of 1932 was taken, but exclusive of 11 killed for food during the year. The condition of the herd was regarded as good.

*St. George Island.*—The reindeer herd on St. George Island on September 30, 1933, contained 63 animals, of which 8 were the young of the season. None was used for food during the year.

## FUR-SEAL SKINS

### SHIPMENTS

On August 20, 1933, the U.S.S. *Vega* delivered at Seattle, Wash., the season's entire take of sealskins, aggregating 54,550 pelts, of which 46,367 were consigned to the Fouke Fur Co. at St. Louis, Mo., and 8,183, or 15 percent of the take, to a representative of the Government of the Dominion of Canada at Seattle in accordance with the provisions of the treaty of July 7, 1911.

### SALES

Two public auctions of fur-seal skins from the Pribilof Islands were held at St. Louis in 1933—on May 15 and August 28, respectively—the combined total amounting to 50,097 skins. In addition, 490 sealskins taken on the Pribilof Islands were disposed of at special sales. With the following detailed statements of these sales, the sales of other fur-seal skins by the Department of Commerce for the account of the Government are included in order that the records may be complete.

*Public auction sale, May 15, 1933.*—At this sale 25,621 Pribilof Islands fur-seal skins, dressed, dyed, and machined, were sold for \$394,303.80. One confiscated skin, dyed logwood brown, was sold for \$23. In addition, 512 Japanese fur-seal skins, which were the share of the United States Government from the Robben Island killings in 1930, 1931, and 1932, were sold for a total of \$1,755.75. Of these skins, 282 were dressed, dyed, and machined, dyed black, 1 was unhaired and dressed, and 229 were raw salted.

*Public auction sale, August 28, 1933.*—The Government disposed of 24,476 fur-seal skins at this sale, of which 24,239 were dressed, dyed, and machined and sold for \$469,702.25. The remaining 237 skins were sold in the raw salted condition for \$59.25.

*Special sales.*—Several special sales of small lots of sealskins were authorized in 1933, in accordance with which 337 black-dyed finished skins were sold for \$6,759.16, and 137 brown-dyed finished skins were sold for \$2,462.06. Two raw salted skins were sold for \$6.70 and 14 specially prepared skins for exhibition purposes were sold for \$350. The gross return from the sale of these 490 skins was \$9,577.92.

The classification and selling price of all sealskins sold in 1933 for the account of the Government are shown in the following tables:



Comparative values, by sizes and grades, with percentages each size, of *Pribilof* sealskins sold at public auction in 1933—Continued

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total price	Percentage
<b>DYED LOGWOOD BROWN</b>										
Extra extra large:										
Aug. 28	I and II. Scarred, Faulty, etc. III	10 9 1	26.00 19.25 7.50	24.50 19.25 7.50	25.70 19.25 7.50	257.00 173.25 7.50	20	21.89	437.75	.32
Extra large:										
May 15	I and II. Scarred, Faulty, etc.	160 100	21.50 15.25	20.00 15.00	20.84 15.13	3,335.00 1,512.50	260	18.64	4,847.50	5.20
Aug. 28	I and II. Scarred, Faulty, etc. III	303 64 2	27.00 19.75 7.50	24.50 19.25 7.50	25.73 19.55 7.50	7,793.00 1,251.00 15.00	369	24.56	9,061.00	8.96
Large:										
May 15	I and II. Scarred, Faulty, etc.	950 600	22.00 14.25	18.75 13.75	19.34 14.03	18,377.50 8,427.50	1,550	17.29	26,805.00	31.00
Aug. 28	I and II. Scarred, Faulty, etc. III	1,634 522 39	31.00 20.00 7.50	26.10 18.25 7.50	26.10 19.05 7.50	42,648.00 8,948.00 292.50	2,195	24.09	52,885.50	35.45
Medium:										
May 15	I and II. Scarred, Faulty, etc.	1,560 1,000 2,044	18.25 13.75 25.00	14.25 11.25 20.25	15.70 12.81 22.99	24,488.00 12,810.00 46,997.75	2,560	14.57	37,298.00	51.20
Aug. 28	I and II. Scarred, Faulty, etc. III	900 91	22.00 7.50	19.00 3.00	20.05 6.04	18,042.50 550.00	3,035	21.61	65,590.25	49.02
Small medium:										
May 15	I and II. Scarred, Faulty, etc.	400 230 291	12.05 9.75 21.00	10.60 9.25 18.00	11.48 9.55 19.08	4,590.50 2,197.50 5,551.00	630	10.77	6,788.00	12.60
Aug. 28	I and II. Scarred, Faulty, etc. III	255 27	15.50 5.00	15.25 5.00	15.41 5.00	3,930.00 135.00	573	16.78	9,616.00	9.25
All classes: May 15 Aug. 28							5,000 6,192	15.15 22.22	75,738.50 137,590.50	100.00 100.00
<b>MISCELLANEOUS</b>										
Aug. 28	Raw. Unbaired Partly Unbaired	71 82 84	.25 .25 .25	.25 .25 .25	.25 .25 .25	17.75 20.50 21.00	237	.25	59.25	100.00

*Special sales of Pribilof Islands fur-seal skins in 1933*

Date	Number of skins	Description	Price per skin	Total
Mar. 31	20	Dyed black, large.....	\$21.28	\$425.60
	17	Dyed black, medium.....	14.01	238.17
Apr. 30	1	Exhibition skin.....	25.00	25.00
June 30	57	Dyed black, large.....	23.60	1,345.20
	83	Dyed black, medium.....	17.35	1,440.05
	48	Dyed logwood brown, large.....	19.34	928.32
	72	Dyed logwood brown, medium.....	15.70	1,130.40
July 30	70	Dyed black, large.....	23.60	1,652.00
	70	Dyed black, medium.....	17.35	1,214.50
	2	Raw salted.....	3.35	6.70
Oct. 31	8	Dyed black, large.....	25.53	204.24
	12	Dyed black, medium.....	19.95	239.40
	4	Dyed logwood brown, large.....	26.10	104.40
	6	Dyed logwood brown, medium.....	22.99	137.94
	7	do.....	23.00	161.00
	13	Exhibition skins.....	25.00	325.00
	490			9,577.92

*Sale at St. Louis, Mo., May 15, 1933, of 512 fur-seal skins received from Japanese Government under treaty provisions*

Number of skins	Trade classification	Price per skin	Total for lot
150	Dressed, dyed, and machined, black.....	\$10.00	\$1,500.00
132	do.....	1.50	198.00
1	Unhaired and dressed.....	.50	.50
229	Raw salted.....	.25	57.25
512			1,755.75

## DISPOSITION OF FUR-SEAL SKINS TAKEN AT PRIBILOF ISLANDS

On January 1, 1933, there were on hand 77,638 fur-seal skins taken at the Pribilof Islands. Of these, 77,606 were at St. Louis, Mo., and 32 at Washington. In 1933 there were taken at the Pribilof Islands 54,550 fur-seal skins, of which 8,183, or 15 percent, were allotted to the Government of the Dominion of Canada in accordance with treaty provisions. Due to a miscount, one of the barrels delivered to the Canadian Government was short two skins, which will probably be found later, either among the skins that were shipped to St. Louis, Mo., or else in salt at the islands. Of the skins on hand at the beginning of the year, 50,587 were disposed of, leaving 27,051 unsold, which with the 46,367 from the 1933 take make a total of 73,418 on hand on December 31, 1933. The following tables show further details in regard to fur-seal skins taken on the Pribilof Islands, as well as details in regard to other Government-owned fur-seal skins under the control of the Department of Commerce.

*Summary of Government-owned fur-seal skins in the custody of Fouke Fur Co.,  
at St. Louis, Mo., calendar year 1933*

Source	On hand Jan. 1	Receipts in 1933	Sales in 1933	On hand Dec. 31
<b>Taken on Pribilof Islands:</b>				
Calendar year 1931.....	28, 270		27, 969	301
Calendar year 1932.....	49, 336		22, 618	26, 718
Calendar year 1933.....		46, 367		46, 367
<b>United States' share of Japanese fur-seal skins:</b>				
Season of 1930.....	172		172	
Season of 1931.....	170		170	
Season of 1932.....	170		170	
Season of 1933.....		170		170
Confiscated fur-seal skin.....	1		1	
<b>Total.....</b>	<b>78, 119</b>	<b>46, 537</b>	<b>51, 100</b>	<b>73, 556</b>

*Summary of all Government-owned fur-seal skins under control of Department  
of Commerce, calendar year 1933*

Source	On hand Jan. 1			Re- ceipts in 1933	Disposed of in 1933		Unac- counted for <sup>1</sup>	On hand Dec. 31		
	Fouke Fur Co.	Wash- ington office	Total		Sales	Deliv- ered to Canada		Fouke Fur Co.	Wash- ington office	Total
<b>Taken on Pribilof Islands:</b>										
Calendar year 1918, held for reference purposes.....		7	7						7	7
Calendar year 1923.....		3	3						3	3
Calendar year 1924.....		1	1						1	1
Calendar year 1929.....		5	5						5	5
Calendar year 1930.....		2	2						2	2
Calendar year 1931.....	28, 270	<sup>2</sup> 14	28, 284		27, 969			301	<sup>2</sup> 14	315
Calendar year 1932.....	49, 336		49, 336		22, 618			26, 718		26, 718
Calendar year 1933.....				54, 550		<sup>1</sup> 8, 181	2	46, 367		46, 367
Miscellaneous skins held for reference purposes.....		4	4						4	4
<b>United States' share of Jap- anese sealskins:</b>										
Season of 1930.....	172		172		172					
Season of 1931.....	170		170		170					
Season of 1932.....	170		170		170					
Season of 1933.....					170			170		170
Confiscated skins.....	1		1		1					
<b>Total.....</b>	<b>78, 119</b>	<b>36</b>	<b>78, 155</b>	<b>54, 720</b>	<b>51, 100</b>	<b>8, 181</b>	<b>2</b>	<b>73, 556</b>	<b>36</b>	<b>73, 592</b>

<sup>1</sup> When the skins shipped to Canada were unpacked, the shipment was 2 skins short of the 8,183 indicated on the shipping list. Probably a miscount was made also in the skins that were shipped to St. Louis, or else 2 skins were inadvertently left in salt at the Islands. An adjustment of the skins due the Canadian Government will be made in the shipment for 1934.

<sup>2</sup> Skins made up into coats for display purposes.

### SHIPMENT AND SALE OF FOX SKINS

On March 10, 1933, the *Penguin* sailed from St. Paul Island for Seattle with the season's catch of 1,143 fox skins. Of these, 271 were taken on St. Paul Island, and 872 on St. George Island. Reshipment from Seattle to the Fouke Fur Co., the Government's selling agent, at St. Louis, Mo., was made on March 22.

On May 15, the Government sold at public auction at St. Louis 682 blue fox skins for \$19,976.50, or an average of \$29.29 per skin.



At the auction sale on August 28, the Government disposed of 560 blue fox skins for \$16,329.50, an average of \$29.16 per skin, and 22 white fox skins for \$496, an average of \$22.55 per skin.

Prices at the May sale ranged from \$69 for a no. I silvery pelt down to \$10 for pelts graded as nos. III and IV. Comparable prices at the August sale were \$82 for a no. I silvery pelt and \$8.50 for nos. III and IV of the poorest quality. These prices indicate, however, an improved market for fox skins as compared with that of 1932, the advance in average price for blue fox pelts from September 26, 1932, to August 28, 1933, being 72.24 percent.

#### SEA-OTTER SKINS

In December 1932 the Sanditz Commission Co., St. Louis, Mo., obtained possession of 12 unauthenticated sea-otter skins which were alleged to have been found by the master of the halibut fishing boat *Northwestern* in a floating oil drum off the Barren Islands, near the entrance to Cook Inlet, Alaska. As no evidence was produced showing that these skins were lawfully possessed, they were forfeited to the Government and were sold at public auction on May 15 at St. Louis for \$2,207. This was the largest seizure of sea-otter skins that had been made in many years.

#### FUR-SEAL PATROL

##### UNITED STATES COAST GUARD

Six vessels of the Coast Guard were detailed by the Secretary of the Treasury to patrol duty along the coast of Washington and Alaska during the migration of the fur seals to the Pribilof Islands. Beginning in April, the *Snokomish* guarded the seals in their northward journey from the southern boundary of Washington to Dixon Entrance; the *Tallapoosa*, from April 15 to 30, between Dixon Entrance and Kodiak, and from May 1 to 15 between Kodiak and Unimak Pass. The *Shoshone* was assigned to Bering Sea from May to July but was replaced by the *Chelan* in July, which with the *Alert* beginning in May and the *Tahoe* in June continued to patrol those waters westward to Attu until the end of the season. The *Northland* assisted in this work on its voyage to and from the Arctic Ocean, where it rendered service during the summer to the settlements on the northern coast of Alaska. This patrol was maintained under the authority of the law giving effect to the convention of July 7, 1911, for the protection of the North American fur-seal herd.

##### BUREAU OF FISHERIES

Two vessels of the Bureau were detailed to seal-patrol duty for a limited time in the spring of 1933. The *Brant* was operated in the vicinity of Neah Bay, Wash., from April 9 to May 12, and the *Widgeon* for approximately 1 month, beginning the middle of April, in the region of Sitka, Alaska. The aborigines carry on pelagic sealing in both of these localities during the northward migration of the seals.

**SEALING PRIVILEGES ACCORDED ABORIGINES**

Under the provisions of the North Pacific Sealing Convention of July 7, 1911, Indians and other aborigines dwelling on the coasts of the waters designated by the convention may take fur-seal skins under limited conditions. In 1933 there were taken and duly authenticated by officials of the respective Governments 2,076 fur-seal skins, of which 92 were taken by Indians under the jurisdiction of the United States, and 1,984 by Indians of Canada. The details are as follows:

*Washington.*—Twenty-nine sealskins taken by Indians of Washington were authenticated. Of these, 17 were from male seals and 12 from females. The skins were taken by Indians of La Push and Neah Bay in the months from March to May, inclusive, and were authenticated by John B. Holm, special agent of the Bureau, and by Raymond H. Bitney, superintendent of the Neah Bay Indian Agency, Neah Bay, Wash.

*Alaska.*—Sixty-three sealskins taken by natives of Sitka were authenticated by Bureau employees. Of these skins, 20 were from male seals and 43 from females. The seals were taken in the waters off Biorka Island in the months of May and June.

*British Columbia.*—An official report received by the Bureau stated that 1,984 fur-seal skins were taken by Indians of British Columbia in 1933.

**JAPANESE SEALSKINS DELIVERED TO THE UNITED STATES**

The treaty of July 7, 1911, for the protection of the fur seals of the North Pacific Ocean provides that the United States shall receive 10 percent of the fur-seal skins taken annually from the Japanese herd. In accordance with that provision the United States received in December 1933 from Japan 170 sealskins as its share of the take on Robben Island in that year. These skins were sent to St. Louis, Mo., to be processed and sold by the Fouke Fur Co. for the account of the Government.

**COMPUTATION OF FUR SEALS, PRIBILOF ISLANDS, 1933**

BY HARRY J. CHRISTOFFERS

In order to ascertain the approximate number of killable male seals arriving at the Pribilof Islands, an annual estimate is made of the number of animals in the herd, based on observations during the year and on past experience. For the purpose of assuring that sufficient 3-year-old males are being reserved for breeding stock, it is necessary to count the number of harem and idle bulls on hand as a means of determining, as accurately as possible, the average harem for the season. It is considered desirable to maintain an average harem of from 40 to 45. Although the opinion is sometimes expressed that an average harem of 50 will answer all requirements, it is believed that this average indicates a shortage of surplus bulls and consequently a shortage of breeders for the late-arriving virgin females. Regardless of the average size of the harem, if there are not enough surplus bulls

to take care of late arrivals, there is not being maintained an adequate reserve for breeding requirements.

In 1933 it seemed safe to kill 52,747 3-year-old male seals. It was apparent that there were sufficient males over 3 years old to take care of breeding requirements, making it unnecessary to reserve any 3-year-old animals while killing operations were in progress. Observations after the close of the killing season indicated that sufficient 3-year-olds remained to assure an ample breeding stock when they enter the surplus, idle, and harem bull classes. The arrival of the annual supply vessel and the consequent work of unloading cargo prevented the marking of any of these animals.

For several years prior to 1932 there was each season an unusually large increase over the previous year in the number of killable seals arriving at the islands, but this could not be expected to continue. These large increases, it is thought, were in the nature of a readjustment as a result of leaving a large reserve in 1923 and subsequent years to compensate for previous close killings. Normally, the average increase in killings would not be more than 7 or 8 percent. Any additional increase in the number of seals killed must be due to particularly favorable conditions at sea during the first 3 years of their life. As the Bureau cannot determine what natural conditions exist in any year, it is impossible to predict accurately what the take of sealskins will be.

If an average rate of growth of the herd is maintained, an unusually large increase in the number of seals taken in certain years would necessarily be followed in succeeding years by no increase at all, or even by a decrease. Undoubtedly it often happens that there may be several years with extremely good conditions at sea, followed by several years with poor conditions in respect to food or freedom from natural enemies, which would affect the mortality of the seals. Upon the basis of past experience it would seem that notwithstanding these fluctuations the number of killable seals arriving at the Pribilof Islands will gradually increase to a point where at least 100,000 may be killed annually. The actual size to which the herd may increase before natural conditions prevent overpopulation of the sea with seal life is, of course, not known.

It is interesting to note that starting with the number of 3-year-olds killed in 1918, the first year of commercial killing after the 5-year closed period, and applying a yearly increase of 8 percent, the number of 3-year-old seals to be killed in 1933 would have been 53,946. Actually, there were 52,747 3-year-old seals killed in that year.

#### BULLS

As in previous years, a census was taken of the harem and idle bulls. Portions of some of the larger rookeries again had to be estimated. The Sivutch rookery could not be counted, and it did not seem desirable to show any increase over the number estimated for that rookery in 1932.

The percentage increase of harem and idle bulls over 1932 was not as large as in other recent years. This would indicate that the larger breeding reserve created during and after 1923 has lowered the average harem to about the desired number.

A great many iron-branded bulls that had been reserved as 3-year-olds in 1923 were observed holding large harems. Some were seen also on the hauling grounds throughout the season. The latter no doubt were late arrivals that did not feel strong enough to fight for harem positions.

*Number of harem and idle bulls, approximate ratio of idle bulls to harem bulls, and average harem, 1933*

Rookery	Date	Harem bulls	Idle bulls	Total	Approximate ratio of idle bulls to harem bulls	Average harem
St. Paul Island:						
Kitovi.....	July 18	376	71	447	1:5	36.80
Lukanin.....	do.....	148	44	192	1:3	45.20
Gorbach.....	July 15	744	143	887	1:5	47.22
Ardiguen.....	do.....	79	13	92	1:6	42.06
Reef.....	do.....	1,377	327	1,704	1:4	51.25
Sivutch (estimated).....		400	85	485	1:5	53.99
Lagoon (actual count).....	July 15	5	1	6	1:5	22.80
Tolstoi.....	July 18	951	223	1,174	1:4	43.68
Zapadni.....	July 19	793	177	970	1:4	50.34
Little Zapadni.....	do.....	453	93	546	1:5	44.92
Zapadni Reef.....	do.....	42	11	53	1:4	16.81
Polovina.....	July 16	329	102	431	1:3	43.61
Polovina Cliffs.....	do.....	279	61	340	1:5	28.16
Little Polovina.....	do.....	123	27	150	1:5	23.26
Morjovi.....	July 17	303	78	381	1:4	16.97
Vostochni.....	do.....	1,932	477	2,409	1:4	29.63
Total.....		8,334	1,933	10,267	1:4	40.94
St. George Island:						
North.....	July 21	683	151	834	1:5	40.76
Staraya Artil.....	do.....	467	79	546	1:6	44.92
Zapadni.....	July 19	161	51	212	1:3	18.39
South.....	do.....	121	4	125	1:30	5.74
East Reef.....	July 22	155	47	202	1:3	41.16
East Cliffs.....	do.....	292	76	368	1:4	62.38
Total.....		1,879	408	2,287	1:5	41.01
Total (both islands).....		10,213	2,341	12,554	1:4	40.96

#### AVERAGE HAREM

The estimated average harem for St. Paul Island (40.94) shows an increase of 2.73 as compared with figures for 1932; for St. George Island (41.01), an increase of 1.80; and for the two islands (40.96), an increase of 2.57.

An average harem of approximately 41 indicates an ideal condition for breeding requirements on the rookeries of both islands. This should continue to result in a maximum increase in the growth of the herd. The slight increase in the average harem over 1932 was undoubtedly due to the dying off of a great many of the bulls reserved as 3-year-olds in 1923. In that year a reserve of 10,000 3-year-olds was made before the commercial killing was undertaken.

The average size of the harem has been determined on the basis of an average increase of 8 percent for the cows. Although the increase in the number of cows for each particular rookery varies considerably

from year to year, the average rate of increase for the breeding grounds as a whole has been fairly constant over a period of years.

*Computation of breeding cows, based on annual increase of 8 percent, and of average harem, in 1933*

Rookery	Breeding cows		Harem bulls, 1933	Average harem		
	1932	1933		1933	1932	Increase (+) or decrease (-) in 1933 from 1932
St. Paul Island:						
Kitovi.....	12,812	13,837	376	36.80	36.29	+0.51
Lukanin.....	6,194	6,690	148	45.20	42.72	+2.48
Gorbatch.....	32,530	35,132	744	47.22	45.75	+1.47
Ardiguen.....	3,077	3,223	79	42.06	43.96	-1.90
Reef.....	65,341	70,568	1,377	51.25	48.87	+2.38
Sivutch.....	19,994	21,594	400	53.99	49.99	+4.00
Lapoon (actual count pups).....	110	114	5	22.80	22.00	+0.80
Tolstoi.....	38,465	41,542	951	43.68	40.96	+2.72
Zapadni.....	36,966	39,923	793	50.34	48.70	+1.64
Little Zapadni.....	18,843	20,350	453	44.92	43.52	+1.40
Zapadni Reef.....	654	706	42	16.81	15.95	+0.86
Polovina.....	13,284	14,347	329	43.61	35.81	+7.80
Polovina Cliffs.....	7,274	7,856	279	28.16	27.04	+1.12
Little Polovina.....	2,649	2,861	123	23.26	22.26	+1.00
Morjovi.....	4,762	5,143	303	16.97	16.59	+0.38
Vostochni.....	53,006	57,246	1,932	29.63	26.12	+3.51
Total.....	315,961	341,232	8,334	40.94	38.21	+2.73
St. George Island:						
North.....	25,779	27,841	683	40.76	39.48	+1.28
Staraya Artil.....	19,424	20,978	467	44.92	42.32	+2.60
Zapadni.....	2,741	2,960	161	18.39	18.40	-0.01
South.....	643	694	121	5.74	6.77	-1.03
East Reef.....	5,907	6,380	155	41.16	39.12	+2.04
East Cliffs.....	16,865	18,214	292	62.38	53.88	+8.50
Total.....	71,359	77,067	1,879	41.01	39.21	+1.80
Total (both islands).....	387,320	418,299	10,213	40.96	38.39	+2.57

### PUPS AND COWS

The estimated number of cows and pups at the islands in 1933 was determined by applying an increase of 8 percent over the number computed for 1932.

The number of dead pups was determined by applying the percentage found dead on each rookery in 1922. For comparative purposes, the dead pups are included in the total number of pups.

*Distribution of pups on the Pribilof Islands, Aug. 10, 1933, and comparison with distribution in 1932*

Rookery	1933				1932	1933
	Living pups	Dead pups	Total pups	Percent dead pups	Total pups	Increase
St. Paul Island:						
Kitovi	13,634	203	13,837	1.47	12,812	1,025
Lukanin	6,545	145	6,690	2.17	6,194	496
Gorbach	34,830	302	35,132	.86	32,530	2,602
Ardiguen	3,244	79	3,323	2.39	3,077	246
Reef	69,538	1,030	70,568	1.46	65,341	5,227
Sivutch	21,067	527	21,594	2.44	19,994	1,600
Lagoon (actual count)	114		114		110	4
Tolstoi	40,965	577	41,542	1.39	38,465	3,077
Zapadni	39,236	687	39,923	1.72	36,966	2,957
Little Zapadni	19,841	509	20,350	2.50	18,843	1,507
Zapadni Reef	700	6	706	.80	654	52
Polovina	14,127	220	14,347	1.53	13,284	1,063
Polovina Cliffs	7,711	145	7,856	1.85	7,274	582
Little Polovina	2,789	72	2,861	3.51	2,649	212
Morjovi	5,039	104	5,143	2.02	4,762	381
Vostochni	56,055	1,191	57,246	2.08	53,006	4,240
Total	335,435	5,797	341,232	1.70	315,961	25,271
St. George Island:						
North	27,451	390	27,841	1.40	25,779	2,062
Staraya Artil	20,437	541	20,978	2.58	19,424	1,554
Zapadni	2,927	33	2,960	1.12	2,741	219
South	682	12	694	1.72	643	51
East Reef	6,284	96	6,380	1.51	5,907	473
East Cliffs	17,943	271	18,214	1.49	16,865	1,349
Total	75,724	1,343	77,067	1.74	71,359	5,708
Total (both islands)	411,159	7,140	418,299	1.71	387,320	30,979

**MORTALITY OF SEALS AT SEA**

The mortality rates used for computing the number of animals in the herd are the same as were used in computing the estimate for 1932. These rates will answer all practical purposes until very abnormal conditions arise.

**COMPLETE COMPUTATION**

The following summary shows the methods used for computing the number of animals in the fur-seal herd of the Pribilof Islands in 1933. The total number of seals of all classes is 1,318,568, or 98,607 more than in 1932. This is an increase of 8.08 percent.

*Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1933.*

Class	St. Paul Island	St. George Island	Total
Pups, estimated.....	341, 232	77, 067	418, 299
Breeding cows, 3 years old and over, by inference.....	341, 232	77, 067	418, 299
Harem bulls, counted.....	8, 334	1, 879	10, 213
Idle bulls, counted.....	1, 933	408	2, 341
Yearlings, male and female, estimated:			
Females born in 1932.....	157, 981	35, 680	193, 661
Natural mortality, 40 percent.....	63, 192	14, 272	77, 464
Yearling females, Aug. 10, 1933.....	94, 789	21, 408	116, 197
Males born in 1932.....	157, 980	35, 679	193, 659
Natural mortality, 40 percent.....	63, 192	14, 272	77, 464
Yearling males, Aug. 10, 1933.....	94, 788	21, 407	116, 195
2-year-olds, male and female, estimated:			
Yearling females, Aug. 10, 1932.....	87, 771	19, 822	107, 593
Natural mortality, 15 percent.....	13, 166	2, 973	16, 139
2-year-old females, Aug. 10, 1933.....	74, 605	16, 849	91, 454
Yearling males, Aug. 10, 1932.....	87, 770	19, 822	107, 592
Natural mortality, 17.5 percent.....	15, 360	3, 469	18, 829
2-year-old males beginning 1933.....	72, 410	16, 353	88, 763
2-year-old males killed in 1933.....	912	189	1, 101
2-year-old-males, Aug. 10, 1933.....	71, 498	16, 164	87, 662
3-year-old males, estimated:			
2-year-old males, Aug. 10, 1932.....	66, 118	14, 983	81, 101
Natural mortality, 12.5 percent.....	8, 265	1, 873	10, 138
3-year-old males beginning 1933.....	57, 853	13, 110	70, 963
3-year-old males killed in 1933.....	43, 158	9, 589	52, 747
3-year-old males, Aug. 10, 1933.....	14, 695	3, 521	18, 216
4-year-old males, estimated:			
3-year-old males, Aug. 10, 1932.....	15, 268	2, 581	17, 849
Natural mortality, 10 percent.....	1, 527	258	1, 785
4-year-old males beginning 1933.....	13, 741	2, 323	16, 064
4-year-old males killed in 1933.....	342	281	623
4-year-old males, Aug. 10, 1933.....	13, 399	2, 042	15, 441
5-year-old males, estimated:			
4-year-old males, Aug. 10, 1932.....	9, 573	1, 778	11, 351
Natural mortality, 10 percent.....	957	178	1, 135
5-year-old males, Aug. 10, 1933.....	8, 616	1, 600	10, 216
6-year-old males, estimated:			
5-year-old males, Aug. 10, 1932.....	9, 820	1, 849	11, 669
Natural mortality, 20 percent.....	1, 964	370	2, 334
6-year-old males, Aug. 10, 1933.....	7, 856	1, 479	9, 335
Surplus bulls, 7 years old and over, estimated:			
6-year-old males, Aug. 10, 1932.....	6, 339	1, 815	8, 154
Natural mortality, 20 percent.....	1, 268	363	1, 631
7-year-old males, Aug. 10, 1933.....	5, 071	1, 452	6, 523
Surplus bulls, Aug. 10, 1932.....	(1)	(1)	2, 893
Natural mortality, 30 percent.....			868
Remaining surplus for 1933.....			2, 025

<sup>1</sup> Estimates have been worked out, insofar as possible, to show approximate number of seals of each class which should be credited to each island. Seals do not, however, haul out in accordance with figures given. Seals born on either island frequent the other island. They travel promiscuously between and haul out on either of the two islands. The total for both islands, however, is approximately correct.

*Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1933.—Con.*

Class	St. Paul Island	St. George Island	Total
Surplus bulls, 7 years old and over, estimated—Continued.			
Breeding bulls of 1932.....	10, 208	2, 229	12, 437
Natural mortality, 30 percent.....	3, 062	669	3, 731
1932 bulls remaining, 1933.....	7, 146	1, 560	8, 706
Breeding bulls of 1933.....	10, 267	2, 287	12, 554
1932 bulls remaining, deducted.....	7, 146	1, 560	8, 706
Increment of new bulls in 1933.....	3, 121	727	3, 848
7-year-old males computed for 1933.....	5, 071	1, 452	6, 523
Surplus bulls computed for 1933.....			2, 025
Total theoretical bull stock for 1933.....			8, 548
New increment of breeding bulls deducted.....			3, 848
Surplus bulls, Aug. 10, 1933.....			4, 700

#### RECAPITULATION

Class	Total	Class	Total
Pups.....	418, 299	5-year-old males.....	10, 216
Cows.....	418, 299	6-year-old males.....	9, 335
Harem bulls.....	10, 213	Surplus bulls.....	4, 700
Idle bulls.....	2, 341	Total, 1933.....	1, 318, 568
Yearling females.....	116, 197		
Yearling males.....	116, 195	Total, 1932.....	1, 219, 961
2-year-old females.....	91, 454	Numerical increase, 1933.....	98, 607
2-year-old males.....	87, 662	Percent increase, 1933.....	8.08
3-year-old males.....	18, 216		
4-year-old males.....	15, 441		





# PROGRESS IN BIOLOGICAL INQUIRIES, 1933 <sup>1</sup>

By ELMER HIGGINS, *Chief, Division of Scientific Inquiry*

(With the collaboration of Investigators)

## CONTENTS

	Page
Introduction.....	314
State cooperation.....	316
Publications.....	317
North and Middle Atlantic fishery investigations.....	320
Haddock.....	321
Mackerel.....	326
Cod.....	328
Flounders.....	329
Shore fishes of the Middle Atlantic States.....	329
Improvement of investigational service.....	334
South Atlantic and Gulf fishery investigations.....	335
Investigation of the spawning habits, larval development, and rate of growth of fishes.....	335
A survey of the fresh waters of Mississippi.....	335
Marine fishes of the Gulf coast.....	336
Shrimp investigations.....	336
Pacific coast and Alaska fishery investigations.....	340
Karluk red-salmon investigation.....	341
Chignik red-salmon investigation.....	342
Bristol Bay red-salmon investigation.....	343
Puget Sound sockeye investigation.....	343
Pink salmon investigation.....	344
Herring investigation.....	345
Investigations concerning the protection of migratory fish at power dams on the Columbia River.....	347
Great Lakes fishery investigations.....	348
Fisheries statistics.....	349
Pike-perches.....	350
Yellow perch.....	351
Cooperative investigations, interior lakes of Wisconsin.....	352
Oyster investigations.....	353
Growth and fattening of oysters.....	353
Prediction of setting in Long Island Sound.....	354
Propagation of diatoms for artificial feeding of oysters.....	354
The use of slag in oyster culture.....	355
Oyster planting in North Carolina.....	355
Oyster investigations in Florida.....	356
Oil pollution investigations in Louisiana.....	356
Experimental studies in oil-well pollution.....	357
Oyster investigations in Washington.....	358
Investigations on aquiculture.....	359
Pond-fish culture.....	359
Trout culture.....	361
Fish diseases.....	367
Cooperative studies of the nutritional requirements of trout.....	368
Limnological investigations in the Rocky Mountain region in the interest of fish stocking.....	372
Quantitative food studies in mountain streams.....	373
Cooperative investigations.....	373

<sup>1</sup> Appendix III to the Report of the U.S. Commissioner of Fisheries for 1934. Approved for publication, June 7, 1934.

	Page
Mussel investigations and pollution studies in interior waters.....	375
Fresh-water mussel investigations.....	376
Pollution studies.....	378
Independent activities of the Fishery Biological laboratories.....	379
Woods Hole Laboratory.....	380
Beaufort Laboratory.....	380
Appropriations.....	382

## INTRODUCTION

The work of the Division of Scientific Inquiry involves studies from a biological point of view of the various fisheries, in order to determine which are showing depletion and what methods may be applied toward their conservation as well as studies for the development of improved methods of cultivating aquatic animals. Research projects during the past year cover three major fields: (1) Marine and fresh-water commercial fishery investigations; (2) aquicultural investigations; and (3) shellfishery investigations. These projects are organized under seven distinct sections, each directed by a responsible and experienced fishery biologist, and are so distributed as to cover each of the major geographical sections of the United States. They include individual researches on more than 30 different species of commercially important food and game fish, shellfish, and crustaceans.

The various projects engaging the attention of the staff of 43 permanent employees were as follows:

### Commercial fishery investigations:

North and Middle Atlantic fishery investigations: Cod, haddock, mackerel, weakfish, scup, bluefish, and flounder.

South Atlantic and Gulf fishery investigations: Shrimp and shore fishes.

Great Lakes fishery investigations: Whitefish, cisco, herrings and chubs, pike perches, yellow perch.

Pacific coast and Alaska fishery investigations: Red salmon, pink salmon, and herring.

### Shellfishery investigations:

Oyster cultural investigations in New England, South Atlantic, Gulf States, and Puget Sound.

### Aquicultural investigations:

Improvements in hatchery technique for feeding and breeding trout.

Pond-fish cultural investigations for warm-water fishes.

Treatment and cure of diseases of hatchery fish.

California trout investigations.

Studies in fish nutrition.

Investigations in interior waters with respect to pollution and the propagation of pearl mussels.

Stream surveys in the national parks and forests.

The scientific investigation of the fisheries, or of the fish on which the fisheries are based, provides data essential for the proper conservation of the resource. We must have information relative to such fundamental facts as the rate of growth, age at maturity, time and manner of spawning, habits of the young, feeding habits of both young and old, extent and direction of migrations, extent to which the various groups of fish mingle, particularly with respect to their interbreeding, and the enemies or other elements in their environment which tend to reduce the abundance of these fish and other forms in which we are mainly interested and from which we obtain our fishery products.

As a logical extension of these "life history studies" investigation relating to the growth and replacement of fish populations and their fluctuations in abundance are finding increasing application with respect to conservation and management of the great commercial fisheries, by yielding early evidence of depletion, should it occur, as a safeguard to expanding industry; and by predictions of future yields as a direct aid in the orderly conduct of the fishing business. The yield of the commercial fishery, and hence the success of a commercial enterprise, is dependent upon the three major variables: Birth rate, death rate, and migration. A "census" of the fish population upon which a fishery depends, revealing the rate of replacement of the stock, the occurrence of unusually successful spawning seasons, the withdrawals from the stock by normal death rate or by commercial fishing, together with additions or subtractions by the migration of the fish themselves, forms the basis for successful predictions of supplies available in future years. Hence, investigations of the commercial fishery are designed to produce evidence of this sort, which has great practical application in the protection as well as the wise use of our fishery resource.

As an aid to the work of artificial propagation of fish for restocking interior waters, studies are also conducted dealing with the pathology and nutrition of fishes and with improvements in hatchery technique and stocking practices. Moreover, aid to the water farmer in the cultivation of shellfish is rendered by the development of improved practices based upon a sound understanding of the natural requirements of the organisms cultivated.

In addition to these regular functions of the Division, various projects were authorized at the end of the year to be carried out as emergency work with funds from the Public Works Administration. These may be characterized as follows:

1. Stream surveys and stream improvement in the national parks and forests. Sixteen parties will spend periods ranging from 3 to 8 months in the field during 1934 in conducting physical and biological surveys of selected areas in the national parks and forests of the United States, distributed as follows: 4 in the Atlantic coast section, 9 in the Intermountain States, and 3 on the Pacific coast. The object of these surveys is primarily to determine a rational and effective policy of stocking these public waters with food and game fishes and, secondarily, to render such aid and advice as is possible in the areas under study to the United States Forest Service, for the purpose of so changing or improving natural conditions as to increase the carrying capacity of these streams and to facilitate natural reproduction of fishes.

2. A study of stream pollution in the Middle West, also financed by the Public Works Administration. A corps of biologists, biochemists, and engineers will be engaged for 1 year in studying the effects upon aquatic life, either direct or indirect, of industrial and trade wastes, domestic sewage, and river silt. Paralleling this investigation will be a further study by a part of the same staff of means of utilizing, in the increased production of fish food and food and game fishes, the nitrogenous wastes now destroyed but of considerable potential value and of isolating and neutralizing at their sources toxic or harmful wastes resulting from industrial processes now lead-

ing to serious pollution of our streams. This is a new attack by newly perfected methods upon the pollution problem from an entirely different angle than heretofore undertaken and if successful may make possible the adoption on a large scale of simplified methods of sewage treatment.

3. Construction of fish screens in the Pacific Northwest by Public Works funds to prevent the destruction of downstream migrating salmon and other food fishes by irrigation works on Government properties such as reclamation projects or Indian reservations.

4. Investigation of the requirements for fish-protective works at the various hydroelectric, irrigation, and navigation dams on the Columbia River. This project has been financed by the Public Works Administration for a study of fishways and other protective works at the Bonneville (Oreg.) Dam and should be extended to the Rock Island and Grand Coulee Dams.

Much of this work will not actually be undertaken until the spring and summer of 1934. Hence, reports of these activities will be presented in the next annual report of this Division.

#### STATE COOPERATION

The biological investigations of the Bureau, forming as they do the very foundation of the conservation efforts of the States, have always received liberal support and in many cases active cooperation from the State fish and game departments. The Bureau's investigations, conducted on the highest scientific plane, are always regarded as disinterested and authoritative, and, hence, exert a very real influence on the trend of thought in conservation circles and on local legislation.

Because of the tremendous field to be covered and the relative inadequacy of financial support, the projects for scientific investigation are necessarily chosen because of their wide and general applicability in the protection and development of the fishery resources, and hence local problems frequently remain unsolved for many years. For example, attention is first given to those great commercial fisheries of importance over wide areas for the purpose of determining their trend and present condition either as a guide to their regulation or as a guide to industry in the better utilization of the annual harvests and in avoiding disastrous gluts or famines in the market.

In determining the changes in relative abundance from year to year of the total supply of species supporting a great fishery, problems of local management arise, which, under the circumstances, must be neglected by the Federal Government and must remain unsolved unless the State Governments are able and willing to cooperate in determining the conditions that affect their local fishery. On the Atlantic coast of the United States, for example, the abundance of fish in any of the bays or channels of Long Island or New Jersey, or even in Chesapeake Bay, are largely determined by the variations in abundance in the main stock of fish in the offshore waters. The Bureau's investigations have shown that the weakfish, the scup, the flounder, and the bluefish all migrate extensively over the area from the Carolinas to Cape Cod, and that the spawning areas for most of these species lie chiefly in southern waters. Hence,

the regulation of fishing in a Long Island bay would have little effect upon the total fish supply, and whether or not net fishing is regulated or prohibited is entirely a matter of local policy of an economic rather than a biological nature. It remains for the State cooperating biologists to determine by appropriate studies the degree of interchange between local and more generally distributed populations of fish, and the effects of fishing different types of gear upon the local supply.

For many years most gratifying cooperation has been received by the Bureau's biologists from the States. California is now engaged in a cooperative investigation of the trout supplies in California, looking toward a more adequate restocking of the streams and a more rational regulation of fishing. New York State is cooperating in the conduct of a study of the nutritional requirements of trout to improve hatchery practices in feeding and rearing. Oregon has arranged to cooperate with a Bureau investigator in a study of fish diseases in hatcheries. Mississippi has during the past year assisted materially in a survey of their fishing waters. Michigan and Wisconsin have cooperated in the study of the great commercial fisheries in Lakes Michigan and Huron, and an extensive cooperative project has recently been completed in Lake Erie in which Ohio and New York were the chief collaborators with the Bureau. North Carolina, Connecticut, Washington, and Louisiana are assisting in investigations looking to the restoration of the oyster beds of their coastal waters, and similar cooperation has been afforded by Florida and Texas in the past. Georgia, Louisiana, and Texas have joined hands with the Bureau in an extensive study of the great shrimp fishery of the South Atlantic and Gulf coasts. Such cooperation should be materially extended for most fish are migratory; few are limited to strictly State waters; many are international.

While cooperation has been most extensive in a study of the marine fishes, a fertile field for further cooperation remains in the inland waters. Especially are the pollution problems interstate in character for the effects of industrial wastes from mining and manufacturing frequently extend down stream through several State jurisdictions. This is a field in which the Bureau has heretofore taken but a minor part, but owing to recent legislation the Bureau is authorized to undertake such studies, and a material extension of this type of work, which can be made most effective with whole-hearted State cooperation, is anticipated.

#### PUBLICATIONS

Owing to the curtailed funds for printing the number of publications resulting from investigations of the staff or conducted under the supervision of the Division has been reduced. The list of papers published by the Bureau during 1933 follows:

HIGGINS, ELMER.

Progress in biological inquiries, 1932. Appendix 2, Report, Commissioner of Fisheries, 1933, pp. 79-147.

SETTE, O. E.

Outlook for mackerel fishery in 1933. Fishery Circular No. 14, 23 pp., 7 figs.

RICH, WILLIS H., and EDWARD M. BALL.

Statistical review of Alaska salmon fisheries. Pt. 4—Southeastern Alaska. Bulletin, vol. 47, pp. 437-673, 55 figs. Bulletin No. 13.

WEYMOUTH, F. W., MILTON J. LINDNER, and W. W. ANDERSON.

Preliminary reports on the life history of the common shrimp, *Penaeus setiferus* (Linn.). Bulletin, vol. 48, pp. 1-26, 11 figs. Bulletin No. 14.

The following papers were published by members of the staff of the Division of Scientific Inquiry or cooperating investigators during the year 1933 outside of the Bureau of Fisheries' series:

BIGELOW, H. B.

Studies of the waters on the continental shelf, Cape Cod to Chesapeake Bay. I. The cycle of temperature. Papers in physical oceanography and meteorology. Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, vol. 2, no. 4, 135 pp., 66 figs., December.

CHAMBERLAIN, T. K.

Ages and shell measurement of two large specimens of *Megalonaias gigantea* (Barnes). The Nautilus, vol. 67, p. 29, July.

DAVIDSON, FREDERICK A.

Temporary high carbon dioxide content in an Alaska stream at sunset. Ecology, vol. 19, no. 2, pp. 238-240.

Homing instinct and age at maturity of the pink salmon. Pacific Fisherman, vol. 31, no. 8, p. 13, July.

U.S. Bureau of Fisheries conducts inquiry life history of pink salmon. The Wrangell Sentinel, July 14.

DAVIS, H. S.

Recent advances in our knowledge of epidemic diseases among fish in the countries bordering on the Pacific. Proceedings, Fifth Pacific Science Congress.

DEASON, HILARY J.

Geological formation of Great Lakes. The Fisherman, vol. 2, no. 3, pp. 3-4, February.

Feeding adaptations in fishes. The Fisherman, vol. 2, no. 7, pp. 3-4, 10-11, July.

DUDEN, WILLIAM R.

Recent advances in the fishing industry. The Fisherman, pt. I, vol. 2, no. 10, pp. 3-4, 10-11, October.

Recent advances in the fishing industry. The Fisherman, pt. II, vol. 2, no. 12, pp. 3-4, 10, November.

ELLIS, M. M., and D. B. CALVIN.

Glycogen storage by fresh water mussels. American Journal of Physiology, vol. 101, p. 32.

FISH, FREDERICK F.

The chemical disinfection of trout ponds. Transactions, American Fisheries Society, vol. 63.

FIRTH, FRANK E.

Concerning three-eyed fishes. The Scientific Monthly, vol. 26, pp. 472-473.

An occurrence of a tunicate killing a fish. Bulletin, Boston Society of

Natural History, no. 69, pp. 3-5.

GALTSOFF, P. S.

Pearl and Hermes Reef, Hawaii, hydrographical and biological observations. Bernice P. Bishop Museum Bulletin 107, 5 pl., 3 charts, 49 pp. Honolulu.

GALTSOFF, P. S., and L. E. CABLE.

The current rotor. Science, vol. 77, no. 1992, p. 242.

GINSBURG, ISAAC.

Descriptions of new and imperfectly known species and genera of gobioid and pleuronectid fishes in the U.S. National Museum. Proceedings, U.S. National Museum, vol. 82, art. 20, 23 pp., 3 figs.

A revision of the genus *Gobiosoma* (Family *Gobiidae*) with an account of the genus *Garmannia*. Bulletin, Bingham Oceanographic Collection, vol. 4, art. 5, 59 pp., 3 figs.

Descriptions of five new species of seahorses. Journal, Washington Academy of Science, vol. 23, pp. 560-563.

- HAZZARD, ALBERT S.  
Fish planting investigations. Utah Agricultural Experiment Station. Miscellaneous Publication No. 10.  
Fisheries research in the Uinta Mountain region. Outdoor America, February-March.  
Some phases of the life history of the eastern brook trout, *Salvelinus fontinalis* Mitchell. Transactions, American Fisheries Society, vol. 62, pp. 344-350, 11 figs.  
The dry fly. The Rocky Mountain Sportsman, August.  
Trout flies and trout foods. The Rocky Mountain Sportsman, September.  
Game fish of the Rockies. The Rocky Mountain Sportsman, November.
- HERRINGTON, WM. C.  
Savings gear and the fisheries code. Fishing, vol. 13, no. 7, pp. 15-16.
- HERRINGTON, WM. C., and J. R. WEBSTER.  
Why there are good and bad haddock years. Fishing Gazette, vol. 50, no. 10, pp. 4-6, 23.
- HIGGINS, ELMER.  
Lobster conservation demands protection for the big egg producers. Fishing, vol. 12, no. 1, pp. 18-20, 40-41.
- HILDEBRAND, SAMUEL F.  
Hybridizing diamond-back terrapins. Journal of Heredity, vol. 24, no. 6, June.
- HOLMES, HARLAN B.  
Importance of biological study to the Alaska red salmon fishery. Pacific Fisherman, vol. 31, no. 1, pp. 23-24, January.
- JUDAY, CHANCEY, and E. A. BIRGE.  
The transparency, the color, and the specific conductance of the lake waters of northeastern Wisconsin. Transactions, Wisconsin Academy of Sciences, Arts, and Letters, vol. 28, pp. 205-259.
- JUDAY, CHANCEY, and E. SCHNEBERGER.  
Growth studies of game fish in Wisconsin waters. Second Report, April.
- KOEHRING, V., and H. F. PRYTHERCH.  
Shellfish opened by new method. Western Fisheries, vol. 6, no. 3, pp. 5-8, July.
- LINDNER, MILTON J.  
Progress in shrimp investigations during the year 1932. Louisiana Conservation Review, vol. 3, no. 2, pp. 50-53, 4 figs., April.
- LOCKE, S. B., and ALBERT S. HAZZARD.  
Utah—resources and activities. Chapter 9, animal life-fish. Department of Public Instruction, pp. 115-147.
- LOOSANOFF, V. L.  
Observations on propagation of oysters in James and Corrotoman Rivers and Seaside of Virginia. 4 pl., 46 pp. The Virginia Commission of Fisheries, Newport News, Va.
- LORD, RUSSELL F.  
What about those hatchery trout? Field and Stream, December.  
Types of food taken throughout the year by brook trout. Transactions, American Fisheries Society, vol. 63.
- MCCAY, C. M.  
A continuous extractor of large capacity. Journal, Industrial and Engineering Chemistry, vol. 5, p. 213.
- MEEHEAN, O. LLOYD.  
The role of fertilizers in pond production. Transactions, American Fisheries Society, vol. 63.
- MOTLEY, H. L.  
Histology of the fresh water mussel heart, with reference to its physiological reactions. Journal of Morphology, no. 2, vol. 54, p. 415.
- NEEDHAM, P. R.  
The California trout investigations. California Fish and Game magazine, vol. 19, no. 2, April.  
Notes on the use of water fleas as fish food. Transactions, American Fisheries Society, vol. 63.
- NESBIT, R. A.  
Do northern weaks come from the South? Fishing, vol. 13, no. 4, p. 8.

NEVILLE, WM. C.

Temperature and the southern trawler. Fishing, vol. 12, no. 12, pp. 4-5.

Will the winter fishery off Virginia ruin the industry? Fishing Gazette, vol. 50, no. 6, pp. 10-11, 16.

PARR, A. E.

A geographic-ecological analysis of the seasonal changes in temperature conditions in shallow water along the Atlantic coast of the United States. Bulletin, Bingham Oceanographic Collection, vol. 4, art. 3, 90 pp., 28 figs., January.

PEARSON, JOHN C.

Movements of striped bass in Chesapeake Bay. Maryland Fisheries, pp. 15-17, May.

Unique fishery for the striped bass or rockfish in Massachusetts. Maryland Fisheries, pp. 16-18, September.

PRYTHERCH, HERBERT F.

The oyster industry has progressed from steadily pursued research and experiment. Fishing Gazette, Annual Review Number, vol. 50, no. 7, pp. 42-45, June.

ROUNSEFELL, GEORGE A., and EDWIN H. DAHLGREN.

Tagging experiments on the Pacific herring (*Clupea pallasii*). Journal du Conseil, vol. 8, no. 3, pp. 371-384, December.

SURBER, E. W.

A quantitative study of rainbow trout production in one mile of stream. Transactions, American Fisheries Society, vol. 63.

Observations on circular pool management. Transactions, American Fisheries Society, vol. 63.

TAFT, ALAN C.

Methods for counting small fish in hatcheries. California Fish and Game magazine, vol. 19, no. 2, pp. 122-126.

California steelhead trout problems. California Fish and Game magazine, vol. 19, no. 3, pp. 192-199.

WEYMOUTH, F. W., MILTON J. LINDNER, and W. W. ANDERSON.

A summary of the life history of the common shrimp, *Penaeus setiferus*, of the South Atlantic and Gulf coasts of the United States. Transactions, American Fisheries Society, vol. 62, pp. 108-110.

WIEBE, A. H.

The effect of high concentrations of dissolved oxygen on several species of pond fish. Ohio Journal of Science, vol. 33, no. 2.

The ability of fresh-water fish to extract oxygen at different hydrogen-ion concentrations. Physiological Zoology.

The oxygen consumption of the black bass (*Huro floridana* LeSueur). Transactions, American Fisheries Society, vol. 63.

VAN OOSTEN, JOHN.

Preliminary report on investigation of chub net meshes in Lake Michigan. The Fisherman, vol. 2, no. 4, pp. 3-4, 8, March.

The following progress reports covering the more important investigations of the Division during the calendar year 1933 were prepared in the main by investigators in charge of the various projects.

#### NORTH AND MIDDLE ATLANTIC FISHERY INVESTIGATIONS

In common with other activities of the Division, the work in this region has been curtailed severely by reduction in available funds, which has necessitated the withdrawal from service of the fisheries research steamer *Albatross II*, and loss from the staff of a junior biologist and two biological aides. This has interrupted to a serious degree much of the field work which furnishes the basis for an appraisal of the conditions of the fisheries and has necessitated discontinuation of the work on cod, flounders, and butterfish, though results of taggings of the first two named continue to be received. Lack of personnel to assist in the analysis of data has also retarded achieve-



ment of results. That our insight into the needs of the fisheries should become clouded at this time is particularly unfortunate for the organization of the fishing industries now in process could be much more effective in providing orderly conduct of the business if information as to the probable future abundance of commercial species were available. Furthermore, the present situation offers unprecedented opportunities for securing sane utilization of the fishery resources and for assuring their continued productivity, if the biological basis for planned utilization could keep pace with the industrial developments.

As now constituted, work in this region has been limited to the investigations on the haddock, mackerel, and certain of the shore fishes of the Middle Atlantic States, notably the squeteague or sea trout and the scup. Thanks to tagging in former years, some additional results may be reported on the cod and on the winter flounder, *Pseudopleuronectes americanus*.

As in former years, the staff, under the direction of O. E. Sette, has been provided with laboratory and library facilities by the Harvard Biological Laboratories and the Museum of Comparative Zoology at Harvard University, Cambridge, Mass., where its members have also benefited from consultation with members of the university, especially Henry B. Bigelow, professor of oceanography and director of the Woods Hole Oceanographic Institution, whose wealth of knowledge and experience relating to marine fisheries research has been ever at the disposal of the Bureau employees. It is a pleasure also to acknowledge the continued cooperation of fishermen and fishing companies in providing data essential to the progress of the work.

#### HADDOCK

During 1933 the investigation of the haddock fishery has been concentrated on the important year-to-year changes in abundance. The work has continued under the direction of W. C. Herrington while the catch record analysis has been handled by J. R. Webster and the collection of data on the Boston Fish Pier by F. L. Widerstrom during the first part of the year and by F. E. Firth during the latter part. Progress both in the field and in the laboratory was handicapped by injuries to two assistants—A. A. Dallas was injured in January while at sea on the otter trawler *Cormorant* and was incapacitated during the remainder of the year, while G. Sinnett, a temporary employee, broke his leg during a tagging trip in June on the line trawler *Mary E. O'Hara*. During the last half of 1933 the work was considerably curtailed by loss of personnel and reduced budget. The present program is confined mainly to a study of changes in abundance and their causes, through analysis of catch records and length-frequency data obtained principally at the Boston Fish Pier where most of the haddock catch is landed.

Results already have provided a good understanding of the causes of the fluctuations and indicate what measures give most promise for counteracting the declining trend of abundance that is becoming evident. This decline, to be discussed below, apparently is the result of the greatly increased fishing strain imposed by the growth of the haddock fleet during the period of 1925–29. Increases and

decreases in the average abundance arise from causes which now appear quite clear cut and comprehensible. An increase follows one or a series of good spawning seasons while a series of poor spawning years results in a rapid drop in the catch. Changes in abundance from bank to bank and within the year principally are the results of mass movements of the fish and appear to follow a fairly regular seasonal cycle. There also is a regular decrease in the catch from summer to winter and an increase from winter to summer which may be the result of seasonal changes in the schooling habits of the fish.

*Georges Bank fishery (including South Channel and Nantucket Shoals).*—Our data show that the rapid increase in haddock landings, from about 85,000,000 pounds in 1923 to more than 250,000,000 pounds in 1929, was due in part to an increase in the otter trawl fleet and in part to a great increase in abundance of fish on Georges Bank which during these years accounted for about 80 percent of the haddock landed in the United States. This high level of abundance was the result of a series of exceptionally successful spawning seasons during the years 1920–24.

The increase in abundance came to an abrupt halt in 1928 as the result of a series of very poor spawning years, 1925–28, which added relatively few young fish to the population. The commercial stock on Georges Bank, lacking appreciable additions of upgrowing young fish from these poor years, in 1928 began to decrease rapidly under the heavy inroads of fishery. However, the total haddock landings continued to rise until 1929 owing to the addition of new boats to the fleet and to the increased proportion of time spent at sea by all trawlers. The rapid decline begun in 1928 continued until 1930 and 1931 when the level of abundance was the lowest in the history of the fishery. In spite of a gradual shift to the use of the new V-D gear the large otter trawlers were averaging but 5,000 to 6,000 pounds of haddock a day compared to the 18,000 to 20,000 pounds averaged in 1926 and 1927 with the less effective type of trawls then in use.

This rapid downward trend in abundance on Georges Bank was finally halted by the young haddock from the successful spawning year of 1929 which reached commercial size in the winter and spring of 1932. As a result of this influx of young haddock the scrod catch in 1932 averaged nearly three times as great as in the previous year while the average catch per trawler day of all haddock was approximately 40 percent more than in 1931.

By the time the 1933 season was well under way the trend in the catch once more turned downward. The 1929 class had attained its maximum effect in 1932 and had begun to decline in the face of a still intensive fishery, and as the 1930 spawning had been a relative failure there were few additions of upgrowing young fish to replace those caught off by the hundreds of line trawlers and otter trawlers hard at work on the banks. Consequently, the average catch per trawler day for 1933 was nearly 20 percent lower than in 1932.

The fishery on Georges Bank appears to be due for a continued decline for the next 2 years unless, as is remotely possible, there develops a considerable immigration of haddock from the eastern banks

(Browns, Sable Island, etc.). The 1931 class, which came into the fishery in the late fall of 1933, to some extent will augment the catch in 1934 but its effect cannot be determined at present owing to our inability to collect sufficient data at sea during the past year. However, a very rough approximation of the relative abundance of this year class, obtained from the limited data collected on trawler trips in 1932 and from commercial catch data for November and December 1933 is that the 1931 class is somewhat less than half as abundant as was the 1929 class at the same age. If this be the case, this group may be sufficiently large to maintain the commercial haddock population on Georges Bank at about the same level as in 1933, providing that the majority of the large otter trawlers continue to do most of their fishing on the eastern banks rather than on Georges. It appears more probable, however, that the catch per trawler day in 1934 will be less than in 1933.

The catch in 1935 depends on the degree of success of the 1932 spawning season. Fish of this year class would have averaged somewhat less than 35 centimeters in length during 1933 and if abundant would have been taken in large numbers by the commercial trawlers. No reports of such catches have been received during the past year; consequently, it appears that the 1932 class was a relative failure. Haddock of this year group can provide the only additions to the fishery in 1935; if it was a failure as the above evidence indicates, the level of abundance in 1935 must again show a marked decline.

*Eastern banks fishery.*—Under eastern banks we have grouped all the haddock grounds east of the Fundian Channel (the deep gully separating Georges from Browns Bank). From present data this gully appears to form a complete barrier to the movements of the young haddock during the entire year and to the older fish during most of the year. For example, the 1929 year class showed no movements across the channel until their fourth winter (that of 1932–33) and the older fish have shown mass movements across this channel only around the spawning season. The details of these movements have not yet been worked out.

The chief distinguishing characteristic of the haddock populations of the regions east and west of the Fundian Channel is the difference in the rate of growth of the younger fish. For example, on Georges Bank the 1929 class reached commercial size during the winter of 1931–32 and spring of 1932, while on the eastern banks the same year class did not reach commercial size until the spring and summer of 1933, a difference of about a year and a half. The same difference is being indicated by the 1931 year class. A difference in growth rate probably continues in the older fish but is less evident because of increasing intermixture of the stocks.

As a result of growth differences the 1929 class did not have its full effect on the eastern banks fishery until the summer of 1933. Only a few boats were fishing the area at that time but shortly afterward most of the large otter trawlers shifted their activities from Georges to the eastern banks in the vicinity of Sable Island, where extremely good catches of serod haddock were being taken. These large serod catches brought the average catch per trawler day for 1933 up to a level approximately 40 percent higher than for 1932.

Because of the recent influx of the 1929 year class into the commercial catch the prospects for the eastern banks fishery in the next 2 years are better than for the fishery on Georges. In the spring and summer of 1934 the upgrowth of young haddock of the 1929 class should cause a very considerable increase in the average catch per day of scrod haddock. The late fall fishery should show an increase over 1933 in the catch of large haddock but a decrease in scrod. The level of abundance for the entire year should be considerably higher than in 1933, depending on how well this stock of fish can survive the present intensive fishery. By 1935 these banks should begin to show a decline similar to that on Georges in 1933.

*Summary for all banks.*—The difference in growth rate on Georges Bank and the eastern areas acts as a very efficient means of spreading over a period of 2 to 3 years the maximum effect of an abundant year class instead of concentrating it in one fishing season. Except for this phenomenon the effects of good and poor year classes would be much more drastic than has been the case. Under these conditions, with a fleet that can operate either on Georges or on the eastern banks, the fishery as a whole can maintain a fairly even level if a good spawning season, such as that in 1929, occurs every 3 years. If good spawning seasons occur at intervals of less than 3 years, the level of the fishery should rise, while if the intervals are more than 3 years, the level should fall.

A summary may now be given of the past and expected future course of the fishery as affected by the spawning seasons 1929–32 of which the 1929 season was very successful, the 1930 season a failure, the 1931 season poor, and the 1932 season appears to have been a failure. Resulting from the haddock spawned in these years there was a distinct improvement in the fishery in 1932 (1929 class on Georges) and maintenance of the catch in 1933 (1929 class on eastern banks). In 1934 the fishery as a whole may be expected to maintain a level near that of 1933, possibly somewhat better (1929 class on eastern banks and 1931 class on Georges) while in 1935 there should be a distinct decline in the catch per trawler day (3 spawning years either failure or poor, 1930–32). Developments in 1936 will depend on whether the 1933 spawning season was a success, fair, or a failure.

A long-range view of the haddock fishery (1916–35) suggests that in the last 10 years there has been a decided decline in the level of abundance of the haddock population. The catch per trawler day during the past 4 years (1930–33) has been but about 52 percent as much as the average for 1916–30 in spite of improvements in the nets and other gear. Taken by 5-year periods the averages per trawler day were 1916–20, 14,600; 1921–25, 13,400; 1926–30, 14,800; 1931–33, 8,100. Even assuming a 25 percent improvement in the catch for 1934 and a level in 1935 equal to 1933, the average for 1931–35 will be little more than half as much as for the previous 15 years.

*Present haddock program.*—To maintain our present qualitative analysis of the condition of the fishery and its expected future trend, we must continue the catch record and length-frequency analysis which has been under way since 1931. In addition, more data on small haddock will have to be obtained at sea from trawler trips. However, if estimates of future abundance are to be more precise and if measures for counteracting the declining trend of the fishery are to

be developed, it is essential that certain additional work be undertaken. This includes a systematic collection at sea of data on the size and abundance of young haddock below commercial size and the study of growth and migrations through analysis of scale data and through tagging experiments.

Among these requirements the one farthest from realization is the collection of adequate data on the size and abundance of the young haddock below commercial size. Although some data of this type can be obtained by investigators making regular trips on commercial trawlers, satisfactory data cannot be collected without the use of an able research vessel equipped for trawling.

The study of growth and migrations through analysis of scales and by tagging experiments has suffered through lack of time rather than lack of material. Some age and growth determinations have been made from the scales to verify the interpretation of our length-frequency data, but we have not been able to give this subject the attention it deserves. Experiments with captive haddock have developed a tag which gave good results from releases along the Maine coast, but so far neither this nor other types of tags tried on haddock caught by commercial fishermen on the offshore banks has given even encouraging results. Since it appears probable that these failures may be caused by the rough treatment necessarily suffered by haddock when taken in commercial gear, it may be necessary to await the time that a research vessel is available to permit the careful handling necessary for tagging operations.

*Savings gear.*—It is apparent that in recent years there has been a decided downward trend in the haddock population level and that under the present fishery this trend can be expected to continue unless remedial measures are adopted. The single most unequivocally practical and beneficial measure now apparent is the prevention of the capture of haddock below market size. These haddock, if left in the ocean, later with increasing size would help to maintain the commercial catch at a higher level than would be possible otherwise. The means by which a large part of this saving may be accomplished has been demonstrated by the Bureau's work on "savings gear" in 1931 and 1932. At present several of the boat operators are trying out the recommended modifications in the construction of otter trawls. The scarcity of undersized haddock during the past year and distractions of the economic situation have prevented the problem from receiving the attention it deserves. Recommendations have been made to the N.R.A. code authorities for including the restriction of mesh size in the fishery code.

*Early life history.*—The 1932 observations on early life history were limited to one June cruise covering the area from Nantucket Shoals to Cape Sable, Nova Scotia. The trip was made possible by the kindness of the Woods Hole Oceanographic Institution in detailing for our use the *Atlantis* with her equipment and crew. Although the cruise was made later in the season than those of the 2 previous years, it provided valuable information on the distribution of the late larval stages of the haddock and added another valuable hydrographic survey to our series of records. Probably of most interest are the returns from drift-bottle releases during 3 successive years, 1931-33, in the Georges Bank-South Channel region.

The returns from 1931 and 1933 are similar in that most of the returned cards were from the shores of New England and the Bay of Fundy. In contrast, almost half of the returns from 1932 releases were from across the Atlantic. Hence it appears that in 1931 and 1933 the surface currents were resultantly westward and northward. In 1932, on the other hand, the drift was strongly to the southward off the banks and thence to the eastward.

These differences are significant because of their bearing upon the destinations of fish eggs spawned in the affected areas. Their continued study may throw much light on the causes for the success or failure of the spawning seasons.

We have been able to continue during the past year the arrangements, with L. A. Walford of the Harvard Graduate School, for the analysis of the collections of eggs and larvae. The results continue to indicate that there is little or no transfer of haddock eggs or larvae from Georges to Browns Bank or the reverse.

#### MACKEREL

A statistical review of the American mackerel fishery, which was completed during the past year, is eloquent of the sharp fluctuations in yield that have characterized this important fishery throughout its history. The investigations here reported upon have been designed to ascertain the causes of these remarkable fluctuations and to devise such means as may be practicable to counteract their ill effects.

It has been found that the changes in abundance responsible for the fluctuations in yield are caused mainly by the unequal numbers of young mackerel added to the stock annually as a result of reproduction. For instance, the additions of young were remarkably large in 1923, 1930, and 1931; they were only moderate in 1921, 1928, and 1929; and were few or none, in all other years. As a result of the remarkable production of young in 1923, the first of the "good years" observed, the catch rose to a peak in 1926. However, with the failure of the ensuing years the catch again declined until the 1928 class of young caused a recovery in 1929. Following this increase there followed another decline which persisted until the highly successful reproductions of 1930 and 1931 increased the commercial stock to a level which in 1932 and 1933 was comparable with that of 1926.

Almost as remarkable as the inequalities in reproductive success from year to year are the differences between year classes in their relative rates of decline and geographical distribution during the years following their first appearance in the fishery. Two general types are distinguishable: a "persistent type" that affords a moderate yield in its second year, a maximum yield in the following year, and thereafter declines moderately, the decline being so gradual that contributions to the commercial catch remain important for a decade or more; and a "transitory type" that furnishes its maximum yield in its second year and thereafter declines so sharply that its effect is felt in the commercial fishery for only 2 or 3 years. The persistent type is further distinguished by its continued presence throughout almost the entire fishing season in waters south of Nova Scotia but

never extending to Nova Scotian waters. The transitory type, on the other hand, appears in the United States fishery mainly in the spring and late fall and also usually extends along the coast of Nova Scotia and even into the Gulf of St. Lawrence.

Obviously, knowledge of the relative abundance of various year classes together with their respective rate of decline according to type affords a basis for predicting future abundance of mackerel. This in turn should permit the industry to plan its activities in advance, thus ameliorating the otherwise disorganizing effects of unexpected gluts and famines of supply.

The knowledge essential for predictions is based on a measure of relative abundance secured from an analysis of the catch per mackerel vessel coupled with a study of the ages of the mackerel present in the stock as judged from samples of the catches landed by commercial fishermen. In 1933, as during former years, this work was under the direction of O. E. Sette, assisted by F. E. Firth, who made the necessary observations on the mackerel catch at Cape May, N.J., during April; at New York during May; at Boston from June to October; and at Gloucester during November and December. Of the 2,651 fares landed during 1933, aggregating 29,528,100 pounds, 1,612 were recorded by localities of capture through interviews with captains and 881 were sampled to provide information on the ages of mackerel, in the course of which 26,094 individuals were measured and 1,733 scale samples were collected and subsequently examined to determine the age of the fish from which they were taken.

The 1933 season interposed unusual difficulties to biological study because, by voluntary agreement among the vessel owners and operators, the activities of the fleet during most of the season were restricted greatly both as to the periods of time each vessel was permitted to operate and as to the maximum fare which each vessel could land. These important modifications in the operations of the fleet required the employment of special methods to determine the abundance in 1933 relative to that of former years. However, by applying appropriate corrections it appears that the abundance of mackerel in 1933 was at least 22 percent greater than in 1932, and that if the fleet had operated without restrictions the catch would have been at least 55,000,000 pounds as compared with the actual catch under the restrictions in force of 29,528,100 pounds. The first-named quantity is within 2,000,000 pounds or 4 percent of the "high estimate" given in our prediction for the season and within 11,000,000 pounds or 25 percent of the "most probable estimate."

Biologically, conditions in 1933 were of particular interest, for the events of this year were critical in determining whether or not the class of 1931 was of the persistent type. Prior to the opening of the season it already had been concluded that the 1930 class was of the persistent type, but there was considerable doubt as to the type of the 1931 class. In predicting, the "most probable estimate" was based on the assumption that it was of the transitory type merely because the latter had occurred somewhat more often than the former. Recognition that the 1931 class might be of the persistent type formed the basis for the "high estimate." Inasmuch as the latter would have been realized if fishing had been unre-

stricted, there is afforded convincing evidence that the 1931 class is of the persistent type.

With two important year classes present in the stock of mackerel, both of them of the persistent type, which may be expected to suffer only a gradual, moderate decline during the next decade, and since these now dominate the catch, it appears that relatively high, though gradually declining, abundance is assured during a number of years even though no important new year classes appear in the immediate future. Of course, the advent of such year classes would raise the level of abundance still higher, perhaps halting the decline and possibly causing heights of abundance exceeding any that have been observed since the present studies were initiated.

The results of predictions during the past 6 years have demonstrated not only the practicability of the method but also have indicated two primary weaknesses which must be eliminated if the system is to attain the accuracy that is essential in the event that commercial operations are to be adjusted to the prospective yield. These are: First, lack of means to estimate the prospective abundance of yearlings; and, second, inability to determine the type of year class prior to its second year in the commercial fishery. We believe that both of these difficulties may be overcome by appropriate investigation of the biological factors involved. To solve the first-named question, the services of a suitably equipped research vessel are necessary to survey the relative abundance of mackerel that are too young to form a part of the commercial catch. The second probably would yield to suitably designed, large-scale tagging experiments coupled with morphometric analyses of the differences between year classes. The personnel and equipment at present available are inadequate to undertake these phases of the work.

A further question demanding early attention involves the merits of the present practice of catching large quantities of yearling mackerel. These mackerel are so small that disproportionately large numbers of individuals must be caught to make up a moderate poundage, and at the same time their worth in the market per pound is usually only a fraction of that of fish only 1 year older. A solution involves a study of the losses through mortality and decreased availability compared with the gains due to increased weight per individual and increased price per pound. Here again much light might result from tagging experiments.

With tagging looming as an important future technique, experiments were undertaken during 1933 to determine suitable methods of marking this delicate species. The results demonstrate the feasibility of securing quantitative results from tagging methods but at the same time they indicate extraordinary difficulties which can be overcome only by special procedure that involves either the services of a research vessel or a chartered mackerel-fishing vessel.

#### COD

The continued interest of W. C. Schroeder, formerly of the Bureau of Fisheries but now with the Woods Hole Oceanographic Institution, in the migration of cod has made it possible to analyze the returns from tagged cod released in 1932 and former years, though



limitation of funds prevented the initiation of any new experiments. The releases of 1931 and 1932 are of most interest, for they were designed to provide information as to whether or not the small cod that predominate on the grounds along the coast of Maine gradually spread to offshore grounds as they grow older and in this way serve to replenish the commercially important stock of large fish offshore. Former markings did not throw light on this question because a large percentage of tags were lost from the fish within the first year, but since 1931 more permanent marks were used and statistically significant returns of cod that were liberated two years ago are being received. Thus far local returns have predominated, which indicates that there is no important spread of the cod from the coast of Maine before their fourth or fifth year. However, of 2,680 tagged in 1931 and 1932, 5 or 0.2 percent were returned from Georges Bank; whereas of the 12,000 comparable releases formerly made with the less permanent tag, only 0.004 percent were reported from offshore grounds. There was a similar improvement of distant recaptures along shore, which indicates that the new-style tags are more suited to the problem than the ones formerly used. It remains for future returns to indicate a more marked offshore movement, if such there be, later in the life of the cod.

#### WINTER FLOUNDER

Of 4,179 tagged winter flounders (*Pseudopleuronectes americanus*) released at Waquoit Bay and Woods Hole during the spawning season (January to April) of 1931, 141 were returned in 1931, 64 in 1932, and 33 during 1933. Last year's returns were consistent with those of former years; the majority were retaken during the spawning season at the place of liberation, and the remainder were reported from the adjacent sounds and the contiguous open sea during other months of the year. Half of the fish were marked with a tag placed at the nape, and half with the tag placed at the dorsal edge midway between head and tail. The marked superiority of nape tags in the third year returns indicates the greater permanence of marks placed in this position.

#### SHORE FISHES OF THE MIDDLE ATLANTIC STATES

These investigations were continued under the direction of R. A. Nesbit. Because of reduced appropriations it was necessary to curtail collections of data in 1933. Daily sampling of the commercial catch at important fishing centers was abandoned completely. Field operations consisted of observation of the winter trawl fishery landings at Portsmouth, Va., during January, February, and March; hatching experiments with squeteague eggs at Wildwood, N.J., in June, and tagging experiments with squeteague in Sandy Hook Bay, N.J., and of Hog Island, Va., in October, and with scup at Woods Hole, Mass., in November. In addition, Prof. A. E. Parr, in cooperation with the Bureau, continued his studies of the biology of the young of food fishes in New Jersey.

*Squeteague*.—In the report for 1932 it was suggested that the most important increments to the New York and New Jersey stocks

of squeteague during the period 1928-32 consisted of fish which had spent their first two growing seasons south of Delaware Bay. This implies that replenishment of the northern stocks of squeteague depends a great deal less on local reproduction than on immigration from more productive southern spawning areas. Further findings during 1933 necessitate substantial modification of this view.

Although these findings strongly support the view that the great majority of the squeteague taken in the northern fishery enter that fishery for the first time as 2-year-old fish after having spent a year as yearlings south of Delaware Bay, it now appears that approximately half of these immigrant 2-year-olds originate in the North and return there after a year spent in the South. This compels a revision of the opinion that northern spawning ordinarily makes no significant contribution to northern stocks of adults. It still appears, however, that these stocks are dependent on southern spawning areas for about half of their increment.

The evidence for this modified view of the rather complex behavior of squeteague consists in part of the results of 1932 tagging experiments, in part of further analysis of scale collections, and in part of the results of a hatching experiment with squeteague eggs. These will be discussed in turn.

During the following summer 47 belly tags were returned from 1,900 juvenile squeteague tagged in October 1932, near Montauk, N.Y. Of these, 14 were taken south of Delaware Bay, 24 in or north of Delaware Bay, and 9 were not accompanied by records of date and locality of recapture. It is certain that many more tagged fish were recaptured than were reported, especially between May and September, for internal tags are not discovered unless the fish are gutted. Since the fish were small (average length 8 inches) when tagged, many were undoubtedly culled from the catch and discarded without examination. Because of the slower growth of southern yearlings, it is probable that a larger proportion of the southern than of the northern summer recaptures were not reported. Thus it is apparent that the southern yearlings which provide the bulk of the northern increment of 2-year-old fish in the following year include an unknown but possibly considerable number of squeteague which originated in the North.

More useful is the evidence from further analysis of the scale structure of fish in representative samples of the commercial catch, for it permits a quantitative estimate of the respective contributions of northern and southern spawning and nursery areas to the northern stock of adults.

The method used previously, that of comparing the early growth increments (as calculated from the scales) of northern adults with the corresponding observed increments of northern and southern juveniles and yearlings, although satisfactory for distinguishing those northern adults which have been in the South as yearlings from those which had been in the North, has not proved adequate to determine where these fish were as juveniles (i.e., fish less than a year old).

In 1933 a method was employed which appears to permit separation of the northern adults according to origin. This consists of

comparing the average spacing of circuli in the first growth zone of the scales of northern adults with the spacing in the corresponding zone of northern and southern juveniles and yearlings. It was found that the northern juveniles and yearlings agree in having a significantly wider average spacing than the southern juveniles and that the frequency distribution of the spacing values of northern adults indicates a mixture in almost equal proportions of fish that have first growth zones characteristic of northern and southern juveniles. The scales of yearling fish show similar differences between the second summer zone circuli when northern and southern yearlings are compared. The great majority of northern adults, however, show second zone spacing of the southern type even though the first zone of about one-half of them is of the northern type.

In order to determine whether squeteague eggs are capable of hatching at the temperatures prevailing in the North during the spawning season, an experiment was carried out jointly by Prof. A. E. Parr and R. A. Nesbit. Squeteague eggs were found to hatch freely at all temperatures from 13° to 25° C. Since this exceeds the range of temperature observed in the northern as well as southern localities where eggs occur, it is certain that low temperatures do not, as suggested previously, prevent successful reproduction in the North. No explanation has yet been found for the uniform absence of squeteague larvae from the northern plankton collections.

Thus far the evidence for the view that the great majority of northern adults, including many that originated in the North, spend their second summer south of Delaware Bay consists of the observation that in the North yearlings are never sufficiently numerous to account for the numbers of older fish in subsequent years; of the observation that the calculated second summer growth increments of northern adults agree much better with the observed growth of southern than of northern yearlings; and of the fact that the spacing between circuli of the second growth zone of the scales of northern adults agrees with that of the corresponding zone of the scales of southern yearlings, and differs sharply from that of the scales of northern yearlings.

Direct evidence from tagging experiments is still lacking. The results of the October 1932 tagging in Pamlico Sound, N.C., indicate that in 1933 very few of these fish migrated to waters north of Virginia. In this experiment 1,900 squeteague were tagged, of which about 1,600 were yearlings or older. In the summer of 1933, 115 tags from yearlings or older fish were returned, 68 from North Carolina, 8 from Virginia and Maryland, including Chesapeake Bay, and 1 from New Jersey. Thirty-eight tags were returned without data as to the location of recapture. Since most of the latter were returned from southern markets, it is probable that the majority were recaptured in North Carolina or Virginia. The interpretation of this lack of northern returns is impossible because of the necessity for abandoning observations of the age composition of the northern catch. Previous observations have proven that increments to northern stock are irregular from year to year. In 1933 very few southern squeteague may have migrated North, in which case none of

the tagged fish from the South could have been expected to show up in the North. As it is, negative evidence is not conclusive and positive evidence must be sought. In a further attempt to secure direct evidence of migration of southern yearlings 900 squeteague, about half of which were yearlings, were tagged off Hog Island, Va., in October 1933.

In order to determine the winter habitat of northern adult squeteague, 220 were tagged in Sandy Hook Bay, N.J., in October. The New York Aquarium kindly lent its collecting vessel, the *Sea Horse*, for this experiment.

Results obtained thus far indicate that if conservation measures are found necessary for maintenance of the general stocks, their application is, in the main, an interstate rather than a local problem. Any locality which imposes restrictions on the catch of marketable fish with the object of improving the future yield at the sacrifice of immediate gain must necessarily bear the whole burden of the immediate restriction but share to some extent any future gain with other localities. For example, if fishing be restricted in eastern New York during the spawning season, any resulting increase in the productivity of the spawning season must be shared with the fisheries of Virginia, Maryland, Delaware, and New Jersey. Indeed, during the season immediately following the whole benefit would accrue to these States, for of the recaptures of juvenile squeteague tagged at Montauk in 1932 not a single individual returned to eastern Long Island in 1933. That this is not exceptional behavior in that year is indicated by the persistent absence of yearlings in New York between 1928 and 1932.

There remain, however, certain local problems which merit further investigation. Foremost among these is that of eliminating the waste of yearlings in a number of southern localities during the early summer. This problem as it applies to Pamlico and Core Sounds in North Carolina was investigated by Higgins and Pearson in 1925,<sup>2</sup> and specific recommendations were made. The results of the 1932 tagging described above indicate that the major part of the gain would accrue locally, even in the following year. Steps should be taken, moreover, to investigate the practicability of modifying pound nets to permit the escape of squeteague below commercial size.

Among the more pressing local problems in New York and New Jersey is further investigation of the factors controlling the supply of squeteague in the many enclosed bays of these States. Thus far, the investigation has been concerned primarily with the causes of fluctuations in the general stock of squeteague on the Middle Atlantic region. It has been assumed that the supply of fish within the bays is influenced primarily by fluctuation in the general stock. It is possible, however, that there may be wide and uncontrollable variations from year to year in the proportion of the total stock frequenting the bays. It is also possible that the fishery within these enclosed areas may be so intensive as to remove fish more rapidly than they enter from outside waters, and thus produce an abnormally low level of abundance during the greater part of each season. Even severe depletion of the bays during a par-

<sup>2</sup> Higgins, Elmer, and J. C. Pearson. Examination of the summer fisheries of Pamlico and Core Sounds, N.C., with special reference to the destruction of undersized fish and the protection of the gray trout, *Cynoscion regalis* (Bloch & Schneider). Bureau of Fisheries, Document 1019, 1927.

ticular season need not be regarded as prejudicial to the future supply either in the bays or in the general stock from which the bay supply is drawn, for the number of fish in the bays appears to represent but a small proportion of the general stock. There is no reason for believing that complete removal of all the fish in the bays by the fishery would influence the future supply to any greater extent than the removal from the general stock of an equivalent number of fish from outside locations. If the commercial fishery alone were concerned, rapid depletion of the inside supply each year would be a matter of little concern, for the total number caught would in any case be limited to the number entering the bays and it would not matter whether they were caught early in the season or later.

However, these bays not only support a commercial fishery but provide a recreational resource of great value. It cannot be determined without further investigation whether unrestricted fishing within these bays is incompatible with maintenance of satisfactory angling conditions. It may be pointed out, however, that angling in the bays at the eastern end of Long Island, N.Y., where commercial fishing is not restricted, does not appear to be less satisfactory than in the New Jersey bays where numerous restrictions are in effect.

*Scup.*—Investigation of this species by W. C. Neville has shown that the pound-net yield is subject to wide fluctuations caused by variation from year to year in success of reproduction. Complete recovery of the pound-net yield in the period 1929–33 from the low levels of 1926–28 demonstrates that under the conditions prevailing until 1929 the fishery was not taking undue toll of the stock. Since 1929 an additional toll of about 25 percent has been taken from the stock by the winter trawl fishery off the Virginia Capes.

As in 1932, attention was focussed on determination of the effects of the increased strain. Thus far there appears to be no evidence of ill effects. Four of five recent spawning seasons, 1927, 1928, 1930, and 1931, are known to have been successful and there is evidence that the 1932 season was productive as well. As a result the yield of the summer fishery remains high. Hence, it is apparent that the combined effects of the summer and winter fisheries have not reduced the numbers of spawning adults sufficiently to prevent successful spawning.

It is not to be expected, however, that all future spawning seasons will be productive. Experience suggests that sooner or later conditions similar to those of 1926–28 will again obtain. Under such conditions the increased strain of the combined fisheries may assume a serious aspect. There remain many facts to be ascertained, if the Bureau is to be prepared to make sound recommendations for the protection of the fishery when the need arises. Particularly is this true of the winter fishery where remarkable and as yet not fully understood changes in the locality and composition of the catch have occurred.

It is desirable, therefore, that the present observations of the winter fishery be continued and that observation of the summer fishery be resumed.

## IMPROVEMENT OF INVESTIGATIONAL SERVICE

This report would not be complete without mention of the things most urgently required to facilitate the acquisition of biological facts necessary for the conservation of the fishery resources of this region.

The principal impediment to progress at present is the lack of assistants to analyze the statistics of the fishery and the biological records necessary for their interpretation. Practically every determination of changes in abundance, average differences in growth rate, and the like involve the handling of mass data, such as the daily catch of a large number of boats over an extensive area throughout a considerable period of time or the summation of large numbers of measurements of fish or of fish scales. The purely clerical work involved in the reduction of such mass data to comprehensible terms attains a magnitude not usually appreciated. Furthermore, more frequently than not, during the course of study the need for additional data from the fishery becomes necessary and progress is halted until the investigator himself can spend the weeks or months necessary to collect them. Here again the provision of assistance would facilitate the work greatly. Due to lack of assisting personnel, both in the laboratory and in the field, the results reported above are fewer in number and much less definite in purport than would have been the case if adequate assistance were available. Under the circumstances it is readily apparent that a very small increase in the salary roll necessary to provide the appropriate assistance would double the value of results by increasing their number and their significance.

Secondly, the lack of a suitably equipped research vessel capable of offshore work has been a very serious handicap. While data collected ashore on the fish brought in by fishing vessels and at sea on commercial fishing craft must always provide the basic material for determining the condition of the resource, the interpretation of these facts requires also the kind of data that can only be secured at sea by a vessel equipped to handle hydrographic instruments, special nets and trawls, and free to survey the particular grounds that must be examined to elucidate the phenomena occurring in the fishermen's catches.

Thirdly, the restoration of activities at the United States Fisheries Biological Station at Woods Hole is needed to complement the regular investigative program. Just as data at sea are necessary to elucidate the peculiarities of yield exhibited by fishermen's catches, laboratory experiments are often required to discover certain basic features of the life processes of fishes and their responses to certain environmental conditions. At the Woods Hole station many of these studies could be pursued by volunteer investigators from universities at no expense to the Government beyond those incidental to care and maintenance of the equipment of the establishment.

**FISHERY INVESTIGATIONS OF THE SOUTH ATLANTIC AND GULF COASTS****INVESTIGATION OF THE SPAWNING HABITS, LARVAL DEVELOPMENT, AND RATE OF GROWTH OF FISHES**

The study of collections of young fish and field data collected principally on the coast of North Carolina was continued during the first several months of the year by Dr. Samuel F. Hildebrand assisted by Louella E. Cable. A comprehensive manuscript, illustrated with drawings prepared by Miss Cable, on the spawning habits, the larval development, and rate of growth of several species of the family consisting of the croakers, drums, king whiting, and weakfish or sea trouts (*Sciaenidae*) was completed and submitted for publication. This paper includes keys for the identification of young *Sciaenidae* of the South Atlantic and Gulf coasts of all the species for which the young are known.

The study of the general collection of young fishes from the South Atlantic was continued. Complete or almost complete series, showing the different stages of development, for several species were found. Drawings were prepared for some of these series.

A young tarpon only about 20 millimeters, in transition from the leptocephalus to the adult stage, was found in the collection. The young of this fish heretofore were unknown entirely. A description, with notes, of this young tarpon was prepared and submitted for publication.

**A SURVEY OF THE FRESH WATERS OF MISSISSIPPI**

A general survey of the fresh waters of the State of Mississippi was begun by Dr. Hildebrand in cooperation with the State Game and Fish Commission. The investigation was conducted for the purpose of determining the status of the fisheries and to study the life histories and spawning habits of the fishes of the State, with the view of gaining information that would be useful in preparing proper regulatory measures and in building up and conserving the fisheries.

The fisheries in general were found to be in a fair to good condition. As Mississippi is still largely rural, the drain on the fisheries has not been as pronounced as in some other States where there is a greater concentration of population. Neither have the waters been as seriously polluted in Mississippi as in many other States. However, in some sections of the State the fisheries have suffered severely because of deforestation and drainage. This has caused fluctuations in the stages of the streams decidedly detrimental to the fish fauna.

A lively interest in fish and fishing was manifested in all sections of the State visited, and an earnest desire prevails on the part of many citizens to build up and conserve this resource.

A report on the investigation embodying notes on the life history and habits of the fishes, recommendations for the improvement of certain waters, and suggestions for improved regulatory measures was prepared. The study of the fishes and data collected is being

continued with the view of preparing a catalog and general account of the fishes of the State.

#### MARINE FISHES OF THE GULF COAST

Continuing his studies of the marine fish fauna of the Gulf coast, Isaac Ginsburg has been engaged during the year in examining collections of fishes from many localities and in revising the taxonomy and classification of a number of families among which confusion exists in the literature as a necessary preliminary to the preparation of a monograph on the fishes of the whole region.

The systematic study of the flounders occurring in American waters was carried forward and continued during 1933, especially those species which are related to the important commercial genus of *Paralichthys*, since for a complete understanding of the status of the species of this genus, it is important to fix definitely the morphological limits of related species. Further studies on the species of *Paralichthys* were also carried out. As a result of these studies a preliminary report on some of the species was published in the Proceedings of the United States National Museum.

Studies were also made on the systematics of two families of the smaller fishes, namely, gobies and seahorses. These fishes are common and form a regular feature of the littoral marine fauna. On account of their common or frequent occurrence they of necessity must play an important role in the complex interrelationship of the littoral marine fauna.

#### SHRIMP INVESTIGATIONS

During 1933 the shrimp investigations have continued as in the past under the direction of Dr. F. W. Weymouth of Stanford University and Milton J. Lindner. Curtailment of funds resulted in the dismissal of Gordon Gunter and a clerical assistant in June, but John C. Pearson, assistant aquatic biologist, was transferred to the staff at this time.

Through the excellent cooperation of the Louisiana Department of Conservation, the Texas Game, Fish, and Oyster Commission, and the Georgia Tidewater Commission the major portions of the shrimp investigation program have been continued in spite of a reduced budget. Headquarters have been maintained at New Orleans, La., in offices furnished by the Louisiana Department of Conservation, with field stations at the United States Fisheries Laboratory, Beaufort, N.C., the Georgia Tidewater Commission, Brunswick, Ga., and the San Patricio Canning Co., Aransas Pass, Tex.

Although three species of shrimp occur in the fishery through most of its range, which extends from North Carolina to the Mexican border, the investigations at present are being directed mainly toward solving problems concerning the life history of the common shrimp (*Penaeus setiferus*). This species is by far the most important because it comprises over 95 percent of the commercial catch. The other two species, the grooved shrimp (*P. brasiliensis*) and the sea bob (*Xiphopenaeus kroyeri*), each furnish about 2½ percent of the catch.



At Beaufort, N.C., Dr. J. S. Gutsell has continued his collections of young and adult shrimp. In addition, he is studying the histological development of ovarian eggs of the three species of shrimp in an attempt to delimit more closely the spawning times and places.

During 1933 the South Atlantic work carried on by W. W. Anderson at Brunswick, Ga., was extended to cover the entire coast from Charleston, S.C., to Cape Canaveral, Fla. This program was initiated in May after an exploratory trip to the Cape Canaveral grounds in January had indicated the possibility of extensive movements of the shrimp along the South Atlantic coast during late fall and winter. Nine stations were established along this 300-mile stretch of coast, as follows: Stono Inlet, S.C.; Gaskins Bank, S.C.; St. Catherines Island and Brunswick, Ga.; Fernandina, Mayport, St. Augustine, New Smyrna, and Cape Canaveral, Fla. The stations are distributed from 1 to 6 miles off the places mentioned. Each locality was visited once every month and 2 or 3 hauls of 1 hour each were made. In addition, the inside waters consisting of the creeks, rivers, and sounds, in the vicinity of Brunswick, were trawled for shrimp each month.

Analysis of the data gathered at these stations indicates that there are no important nursery grounds for the common shrimp south of St. Augustine, Fla., while the reticulated coastal sections of Georgia and northern Florida appear to be the major nursery area of the South Atlantic. This observation tends to corroborate other evidences which imply that the postlarval shrimp that spawn in the ocean or Gulf of Mexico and pass their larval stages there must reach the inside waters at an early stage in order to survive. Additional work is needed to substantiate this point definitely.

Length frequency distributions of the common shrimp along the Georgia coast during the fall and winter of 1931-32 and 1932-33 show a definite disappearance of the large shrimp (above 140 millimeters) from the fishery areas. During both years this disappearance began with the onset of cold weather in October and reached its maximum in January and February. Coincident with the disappearance of the large shrimp from the Georgia grounds there arose a fishery in the vicinity of Cape Canaveral, Fla. This Florida fishery usually reached its maximum in January and rapidly declined thereafter until by the latter part of March only a remnant remained. The January (1933) trip to these southern grounds disclosed the fact that the shrimp population at Cape Canaveral was composed almost exclusively of large shrimp, for over 97 percent were above 140 millimeters and 62 percent were between 156 and 170 millimeters.

This evidence would indicate a southward movement of the large shrimp throughout the fall and winter with a concentration near Cape Canaveral. However, during the fall and winter of 1933, although the scarcity of large shrimp was as evident along the Georgia coast as in the previous two years, the Cape Canaveral fishery failed to materialize to the extent it had during the previous two winters. This leads to four possible hypotheses: (1) The movement of shrimp is not from north to south, but from inshore to offshore waters; (2) the large shrimp at Georgia points were depleted during the summer and early fall fishery, consequently only a few remained to move

south; (3) instead of wintering near Cape Canaveral as in recent seasons the shrimp moved further south along the Florida coast and out of the customary fishing grounds; (4) the shrimp migrated south to Cape Canaveral, but because of colder waters along the coast moved offshore to warmer waters nearer the Gulf Stream.

Because of the lack of data over a sufficient number of months, it is impossible to state at this time which of these hypotheses represents the true situation. It is extremely important that the present studies, with some modifications, be continued in order to arrive at a correct solution of the problems involved as they are of vital importance economically and biologically.

In addition to the above, the South Atlantic operations have yielded sufficient information to allow the projection, for the first time, of what appears to be a normal growth curve. The constant influx of young shrimp into the fishery and the continual movements of the shrimp from place to place have made this impossible in the past. Application of this curve to data gathered along the South Atlantic and Gulf coasts indicates that there may be a longer spawning season than at first suggested and also that there may be two peaks of spawning, one in winter and the other in late spring and summer.

In Texas, Kenneth H. Mosher has continued the sampling of the commercial catch of shrimp at Aransas Pass. In addition, the Texas program has been extended along the coast to cover the major shrimping ports monthly. In each locality a random sample of shrimp is taken from a number of fishing boats. The shrimp are sexed, measured, and the degree of maturity noted.

An analysis of the Texas lighthouse temperature records including Sabine Pass Light, Galveston Jetties Light, Half Moon Reef Light, Aransas Pass Light, and Brazos Santiago Light, indicates an inshore cold water barrier near Point Isabel, Tex., that averages 20° F. colder during the summer and 10° F. colder during the winter than any of the more northern Texas points. Because of the lack of sufficient offshore water temperatures adjacent to Point Isabel, it is difficult at this time to state how representative the water temperatures at Brazos Santiago Light are of the conditions in the Gulf near Point Isabel. The occurrence of a cold water barrier in this locality would have considerable influence on the coastwise movement of shrimp, fishes, and other marine life in southern Texas and northern Mexico.

In Louisiana, owing to decreased funds, the collecting trips of the Bureau's research vessel *Black Mallard*, which is maintained by the Louisiana Department of Conservation, were reduced to 1 a month but of slightly longer duration, instead of the customary 2. John C. Pearson has examined the entire plankton collections secured since the inauguration of the study in Louisiana and has found that young postlarval *Penaeus brasiliensis* occur in the surface offshore tows throughout the winter, spring, and summer, which indicates an extended spawning season for this species. Although *P. setiferus* is much more abundant than *P. brasiliensis*, no post-larval young of this species have been secured in the surface tows. From this evidence it is believed that the young stages of *P. setiferus* are demersal. The recent addition of new hoisting equipment

allows for the operation of subsurface and bottom fine mesh nets. Consequently, it is expected that during the coming spawning season the young stages of *P. setiferus* will be found in considerable abundance in the offshore waters.

Body proportional measurements of *Penaeus setiferus* in Louisiana indicate the possibility of two groups or races of common shrimp. This work is still in a formulative stage and must be continued over a longer period of time and in more localities before definite conclusions can be drawn.

In Louisiana and Texas a disappearance of large *Penaeus setiferus*, similar to that in Georgia, takes place during the winter. In these two States there is no winter fishery for large shrimp, such as occurs in Florida, to indicate where the winter habitat may be. At the onset of colder weather in the fall the shallow coastal waters of Louisiana cool rapidly to a distance of about 10 miles offshore. Further offshore, beyond this variable zone, bottom temperatures are higher. As greater depths are reached, however, bottom temperatures of the Gulf again decline. Consequently, there is a zone of warm bottom water off the Louisiana coast throughout the winter bounded on one side by colder inshore waters and on the other by the cold waters of the depths of the Gulf. The recent addition of a winch to the *Black Mallard* has allowed collecting cruises in this warm water zone as weather permitted. Both large *P. setiferus* and *P. brasiliensis* were found in this area during the winter of 1933. Collecting trips are made throughout this warm water zone off Louisiana whenever possible in an effort to determine whether or not shrimp concentrate in dense schools in certain offshore localities as it is customary for them to do inshore. With the present type of vessel it is exceedingly difficult to make any intensive survey of offshore waters because rough seas are prevalent throughout most of the winter.

The grooved shrimp, *Penaeus brasiliensis*, evidently spawns most prolifically in the Gulf throughout the winter for during December, January, February, March, and April an abundance of postlarval young are taken in the surface plankton tows. From March until June the young grooved shrimp which were spawned in the Gulf are found in large quantities in the inside waters along the entire Louisiana coast. As they develop, the grooved shrimp disappear from the inside and adjacent offshore waters and few remain by July or August. These shrimp, with few exceptions, cannot be found until the following winter when a newly hatched group of young appears. During the winter of 1933 large, mature grooved shrimp were obtained in nearly every haul in the offshore warm water zone. This fact indicates that the inside waters serve not only as nursery grounds for the common shrimp but for the grooved shrimp as well. The grooved shrimp, however, move offshore at an earlier stage than the common shrimp. With the present geographic limitations of the fishery, the young grooved shrimp leave the fishing areas before they have reached sufficient size to be of much commercial value.

Except for the detailed accounts of one cannery, it has been impossible to secure adequate catch records to determine the relative abundance of the shrimp. The data which have been obtained do not indicate serious depletion of the supply, but this fact does not

indicate that depletion will never occur. On the contrary, because of the short life of the common shrimp, which is believed to be only 1 year, it is possible that depletion can become a serious problem. Consequently, it is recommended that all States utilizing shrimp commercially provide for records of the catch suitable for purposes of abundance analysis. Louisiana is the only State which has taken steps toward this goal. The Louisiana Department of Conservation recently inaugurated a system whereby any person receiving shrimp directly from a fisherman must complete a form furnished in triplicate by the State. The completed form gives the following information: The date, the name of the person receiving the shrimp, the name of the fisherman or captain, the name and registration number of the boat, the approximate locality of the catch, the type of gear (seine, trawl, or cast net) used, the length of the net used, the amount of shrimp received, and the price paid for them. The original is given to the fisherman, the first carbon retained by the purchaser, and the second carbon held by the purchaser until collected by an agent of the conservation department. In this way the required information is obtained daily on each catch of shrimp by every fisherman.

If this system is continued in the proper manner, it should be possible within a few years to determine closely any annual fluctuations in the abundance of shrimp in Louisiana. A definite knowledge of the abundance of shrimp is not only of benefit to the State, in that when depletion occurs it may be detected in its early stages and proper remedial actions taken, but also such knowledge is of great benefit to the industry because it will tend to prevent the enactment of restrictive measures when they are not required.

It is strongly urged that the other States of the South Atlantic and Gulf area follow the course of Louisiana and adopt adequate statistical systems for the ultimate benefit of the State and of the industry.

#### **PACIFIC COAST AND ALASKA FISHERY INVESTIGATIONS**

The major salmon and herring investigations carried on by the staff of the Fisheries Biological Station at Seattle, Wash., were continued during 1933. Although the field activities of these investigations are confined to definite localities in Alaska and on the Pacific coast, they all have as their common goal the study of the causes responsible for the fluctuations in the abundances of these species with the aim of providing for permanent and productive fisheries throughout the entire region.

The development of two power dam projects on the Columbia River during the past year necessitated a study of the ways and means of protecting the migratory fish at the dams. During the summer and fall a survey was made of the salmon and trout populations in the Columbia River and its tributaries in the vicinity of the dam site for the Grand Coulee Dam in the State of Washington. The results from this survey were used as a basis for recommendations concerning the protection of the migratory fish at this dam. In the latter part of November, Harlan B. Holmes, one of the members of the station's staff, was temporarily assigned to the study of the ways and

means for protection of migratory fish at the Columbia River Dam at Bonneville, Oreg.

#### KARLUK RED-SALMON INVESTIGATION

The biological investigation on the Karluk River red salmon, conducted by J. T. Barnaby, was continued during the past year. The prime purpose of this investigation is the determination of the ratio between the spawning escapement and the return from that escapement; the determination of the fluctuations occurring in these ratios from year to year; and the causes for such fluctuations. A thorough knowledge of the magnitude of these fluctuations and their causes will enable an economically sound regulation of this fishery as well as of other fisheries of a similar nature.

Another marking experiment was initiated, 40,000 seaward migrants being marked by the amputation of the two ventral and the adipose fins. The returns from this experiment will appear in the runs of 1934, 1935, and 1936. The 1933 run was sampled throughout the season for the purpose of recovering fish marked in previous years; 178,080 fish were carefully examined and 931 marked fish recovered. These marking experiments will, when completed, enable the determination of the fluctuations in the ocean mortality of these red salmon, the calculation of the number of seaward migrants during the year each experiment was initiated, and the calculation of the mortality rate during the time these fish spent in Karluk Lake.

Scale samples were taken throughout the season for the purpose of determining the age composition of the run. A weir was again operated in the Karluk River and the age composition of the escapement can also be calculated from the data thus obtained.

Special attention is being given the data collected to date in respect to returns from known escapements to ascertain to what extent heredity influences the time of migrating to the ocean and the time of returning to spawn. There is a considerable degree of variation from year to year in the age composition of the runs and likewise of the escapements. It is felt that this study, together with the limnological investigations being carried on at Karluk Lake, will, at least to some extent, clear up the problem of why escapements of similar magnitudes produce different-sized returns.

Two trips were made to Karluk Lake, one during July and one during October, at which time spawning-ground surveys were made and limnological data collected.

In addition to the red-salmon run, the Karluk River supports a run of pink salmon of considerable importance. With a normal escapement, the pink salmon occupy the spawning grounds in Karluk River proper and none enter Karluk Lake to continue on to the red-salmon spawning beds. Thus, while both species spawn in the same watershed, their spawning grounds are distinct. Occasionally, however, due to a series of conditions unusually favorable to the pink-salmon population, certain brood years produce extremely large runs. At such times population pressure forces some of the pinks to continue on to the red-salmon spawning grounds. In years when the number of pinks on the red-salmon spawning grounds is not large, no harm

is done. However, at times when there is a relatively large escapement of pink salmon there is not only overcrowding on the pink-salmon spawning grounds, but serious overcrowding on the red-salmon spawning grounds. This condition may be severe enough to result in almost total loss of all pink-salmon spawn, and a very serious loss of red-salmon spawn through the suffocation of unspawned pinks and reds and damage to the eggs already laid in the gravel beds.

A report submitted to Commissioner Bell pointed out that although the data for use as the basis for the prediction of a future run of pink salmon are meagre, all the evidence at hand points to an extremely large run of that species to the Karluk River in 1934. Recommendations were submitted as to the most advisable remedial action in case a large run does materialize.

#### CHIGNIK RED-SALMON INVESTIGATION

An investigation of the red-salmon runs of Chignik River, Alaska, was continued by Harlan B. Holmes, assisted by George B. Kelez. As a result of shortage of funds, field work was restricted to what could be done by one man. This consisted essentially of collecting routine data relating to the season's run of mature fish and recovering mature fish that had been marked as fingerlings.

The principal object of this investigation is to determine the number of fish that should be permitted to spawn each year so as to produce the greatest surplus for the commercial fishery in the succeeding generations and at the same time protect the run. The procedure has been to observe the results of propagation of varying numbers of spawners. With a few minor interruptions, the number of spawners has been counted each year from 1922 to 1932. In 1933 high water prevented counting.

As a significant proportion of the fish do not mature until in their sixth year, returns from only the first six broods are now available. Complications in the life and habits of the fish have delayed exact analysis of the results. Tentative interpretations suggest that the relation between number of spawners and number of adults produced is not as regular as we hoped to find it. The ratio of number of spawners to return has varied from approximately 1/1 to 1/7. The largest ratio accompanied the smallest number of spawners, but the smallest ratio did not coincide with the largest spawning escapement. The largest total return was produced by the largest spawning escapement, but in contrast to this the second largest escapement produced the smallest total return. It, therefore, will be impossible to state, even approximately, the most desirable number of spawners until more experience is available. It is hoped that in the meantime we may acquire a greater knowledge of the life of the fish and the conditions that affect their mortality, both of which will permit more exact analysis of the data and application of the findings to other streams.

A peculiar feature of the Chignik red salmon is the fact that fingerlings are found in the river below the lakes from May through September or later. In other streams the fingerlings are found in the lower river only during a short period of seaward migration. It

first was presumed that the seaward migration at Chignik extended for the 5 months. As it was realized that such a long migration period would result in scale characters that would be confusing in age determination from the adult scale, 65,000 of the presumed migrants were marked in 1929. The marking was divided into three lots, the fish in each lot being distinctively marked. The first lot represented fish caught between May 29 and July 4; the second lot from July 11 to July 24; the third from August 16 to August 26.

The mature fish from this marking, which returned to spawn during 1932 and 1933, have added interesting and valuable information to our knowledge of their life and habits. Among the returns from the first lot 67 percent continued on to the ocean during the year in which they were marked, whereas the remaining 33 percent lingered an additional year in fresh water. Of the second lot only 4 percent migrated during the year of marking and 96 percent remained in fresh water for an additional year. In the third lot only 3 percent migrated and 97 percent remained for another year. These observations indicate that the seaward migration is confined essentially to the early part of the season and that for the remainder of the season the fingerlings found in the river—even down to the entrance of the estuary—must return to the lake before winter. Preliminary returns from marking in 1930 and 1931 confirm these findings and indicate that this peculiar habit is a regular occurrence.

#### BRISTOL BAY RED-SALMON INVESTIGATION

Although funds were not available for a biologist to carry on field work in Bristol Bay during the past year, scales of the 1933 red-salmon populations in this area were secured through the cooperation of the Alaska Division of the Bureau. Scale samples and body measurements of the red salmon composing the runs in Bristol Bay have been accumulating for a number of years. These data were studied by Dr. Frances N. Clark at Stanford University during the past year. Dr. Clark analyzed the data from the Nushagak area of Bristol Bay, and included in a report the results of this analysis together with recommendations for future investigations in this area. This report, "Red salmon in Nushagak district, Bristol Bay", is now on file in the Washington office.

#### PUGET SOUND SOCKEYE INVESTIGATION

The study of the fluctuations in abundance of sockeye salmon of Puget Sound in the State of Washington was continued during the past year, under the direction of J. A. Craig. For the purpose of this investigation, a statistical study has been made of the catch return of a constant unit of gear fished during a constant period of time.

Total catch or pack records are often inaccurate and at times even misleading when used for the purpose of judging the relative abundance of a population of fish over a period of years. This must necessarily be so when it is evident that economic conditions, changes in total fishing effort, legislation, or a change in fishing methods might cause fluctuations in the total catch of any species quite apart from any changes that might have occurred in actual abundance.

Records of the daily catches of a selected group of traps in Puget Sound were collected and analyzed on the basis of the average catch per trap per fishing day, thus providing a constant unit of fishing gear and time. When these records were analyzed and compiled in the form of an index of abundance, the index indicated a marked drop in the abundance of the Puget Sound sockeyes from 1917 to 1932, inclusive.

A detailed inspection of the daily fluctuations in abundance of the sockeye salmon during each fishing season indicates that the middle portion of the season, which, at one time provided a large part of each season's catch, has suffered the greatest decline. This may be very significant, since from previous studies of red or sockeye salmon it appears that each tributary of a large river system such as the Fraser, which provides practically all of the Puget Sound run, may support a separate race or population of sockeye salmon each of which has a definite time of migration into the stream. Therefore, this decline of the middle portion of the run may indicate that certain races are being more rapidly depleted than others and are in need of protection.

Scale samples were taken during the past fishing season. These will be studied in an attempt to link scale characteristics to the seasonal fluctuations in the run. If this can be accomplished, the degree of racial differentiation during the season can be established, and possibly some of the races identified in the commercial fishery and their spawning grounds determined.

Marked fish from the Birdview, Wash., marking experiments of 1929, 1930, and 1931 were recovered from the commercial catch during the past season. This experiment was carried on for the purpose of determining the most favorable time for the liberation of hatchery-reared sockeye salmon.

#### PINK-SALMON INVESTIGATION

The pink-salmon investigation in southeastern Alaska, under the direction of Dr. Frederick A. Davidson, was continued during the past year and included a cooperative project with the National Canners Association of Seattle in addition to the regular program of activities.

One of the natural handicaps encountered in the pink-salmon fishery is the rapid decrease in the quality of the salmon as they become sexually mature. With the onset of sexual maturity the male pink salmon develops an enormous hump on his back and a greatly elongated grotesque head. The hump is composed mostly of cartilage and is grown at the expense of the fatty and muscular tissue of the back. The female pink salmon, on the other hand, changes very little in body form with sexual maturity but owing to the heavy drain imposed upon its stored energy, by the maturation of the eggs, it likewise deteriorates in condition very rapidly. In fact as both males and females become sexually mature their flesh becomes soft and loses practically all of its fat content and red coloration.

When the pink salmon migrate into the inside waters of southeastern Alaska, they practically cease feeding and depend upon their stored energy for maintenance and growth during the remainder of



their life cycle. The pink salmon that appear in the first part of the season are sexually immature and draw upon their stored energy only for the purpose of maintenance during their migration to the spawning grounds. As the season progresses, however, the salmon composing the runs begin to show signs of sexual maturity while still in the waters subject to the commercial fishery. Hence these salmon draw upon their stored energy for maturing the sexual products as well as for maintenance during their migration. It is owing to this double drain upon their stored energy that the pink salmon entering the commercial catch during the latter part of the season are of poorer quality.

The percentage fat content and degree red coloration in the flesh of the Pacific salmon have for years been used as a market standard for quality. Hence, any information concerning the seasonal change in these measures of quality in the pink salmon would be of value to the cannerymen in grading their packs. It is for this reason that the National Cannerymen Association of Seattle cooperated with the Bureau in a project aimed to determine the change in the percentage of fat content and degree of red coloration in the pink salmon entering Snake Creek at Olive Cove, Alaska, during the past summer. Ten pink salmon were taken at random from the run each day during the season. These fish were first measured in order to estimate their state of sexual maturity as indicated by their body form. A proportionate cut was then taken from each fish and canned in a half pound can. At the close of the season these canned samples were turned over to the National Cannerymen Association to be analyzed. Each canned sample of fish bore the date it was taken and the sex of the fish so that the chemical analysis will indicate the change in the composition of both sexes throughout the season. The results from the analysis of the change in the body form of the pink salmon show that sexual maturity began to appear in the salmon at the beginning of the third quarter of the season. The results from the chemical analysis of the samples have not as yet been completed.

The study of the racial characteristics of the pink salmon composing the runs in Snake Creek and Anan Creek in southeastern Alaska were continued during the past summer. The data collected for this study during the past summer will complete the data necessary for the study of the racial characteristics of the pink salmon in these streams for two complete life cycles; viz, the 1930-32 cycle and the 1931-33 cycle. The results from this study thus far point very definitely to a racially distinct population in each stream. There is also some indication that the even- and odd-year populations in each stream are likewise distinctly different. The analysis of the data collected this year will make it possible to draw definite conclusions in regard to the individuality of the odd- and even-year populations in each stream.

#### HERRING INVESTIGATION

In December 1933 the herring investigation, under the direction of Dr. George A. Rounsefell, assisted by Edwin H. Dahlgren, submitted to the Bureau a report on the races of herring in southeastern Alaska. The populations of herring were studied by

analyses of vertebral counts, growth rates, the proportions of various year classes and by the recovery of tagged herring.

In analyzing the vertebral counts only counts of herring of the same year class were compared as it was shown in a previous report on the herring of Prince William Sound, and is too apparent in these data to need proof, that the mean vertebral count differs between herring of different year classes from the same locality. Segregation of the material by year classes has not been followed in the European racial work on herring, which fact doubtless accounts for many of the inconsistencies in results.

In order to be certain that grouping the samples by localities would not in itself bring out differences that were really due merely to random sampling two tests were first made to determine if the data as a whole were homogeneous. The first test was to determine whether or not any correlation exists between the mean vertebral count in the various localities of one particular year class and the temperature during the spawning period of each locality. High negative correlations were found for the 1927 and 1926 year classes, respectively. The second test was to analyze the variances of 158 samples of the vertebral count in the manner shown by R. A. Fisher, after first discarding four of the samples whose variances exceeded the normal range of variances. This test showed very conclusively that the samples are not homogenous, and that the differences between the means are too great to be assigned to chance sampling.

Application of the same test to the samples from each of seven major localities gave opposite results. In each case all of the differences between the means of samples could be assigned to random sampling. This also was in accord with the assumption that different localities might possess different populations of herring.

Comparisons of the means of the vertebral count from the various localities revealed three groups of herring that differ significantly from their neighbors: namely, Petersburg, Noyes Island and vicinity, and the localities east of Clarence Strait and south of Sumner Strait including Wrangell.

Comparisons of the length distributions of herring of the same year class show that herring of four localities: the Noyes Island area, the Douglas Island-Icy Strait area, Affleck Canal and Peril Strait are all much slower growing than those from the other localities. The Peril Strait herring appear to be the slowest growing of any yet encountered in Alaska, the median of the 4-year olds taken in June 1930 being only 176 millimeters.

Comparisons of the age distributions of purse-seined material (avoiding the selected distributions derived from gill-netted samples) caught in 1929 and 1930 show (1) the 1926 year class to be overwhelmingly dominant in most of the localities, (2) the 1926 and 1927 year classes to be approximately equal at Noyes Island, (3) the 1927 year class to be very dominant in Peril Strait, (4) the 1926 and 1923 year classes both dominant at Douglas Island and at Favorite Bay, (5) a large percentage of the catch older than the 1923 year class at Douglas Island. These facts support the evidence given by the vertebrae and the growth rates which separate the Noyes Island area, Peril Strait, and the Douglas Island-Icy Strait area from neighboring localities.

During the fishing season of 1933 (June 1 to Sept. 30) 101 belly tags and 7 opercle tags were recovered from 2,499 of the former and 1,470 of the latter affixed to spawning herring released at Jamestown Bay (Sitka) between April 21 and April 25, 1933. All of these tags were recovered around Cape Ommaney, between Larch Bay and Port Alexander, giving the first definite proof of a migration of some length, as it is approximately 66 miles by water from Jamestown Bay to Port Alexander.

On the other hand, out of 996 belly tags and 824 opercle tags affixed to herring released at Cape Bendel, just under 60 miles from Port Alexander, on August 17, 1932, no tags have been recovered. This may be considered rather definite evidence of a lack of migration between Cape Bendel and Cape Ommaney.

In another tagging experiment at Auke Bay near Juneau, 800 belly tags and 772 opercle tags were affixed to spawning herring released on May 3, 4, and 5, 1933. No recoveries have been made supporting the previous conclusion of a lack of migration between Juneau and Cape Ommaney.

The recovery in the Jamestown Bay (Sitka) tagging experiment of 4 percent of the belly tags and only one-half of 1 percent of the opercle tags clearly demonstrates the superiority of the former. The maximum lengths of time elapsing from time of tagging to time of recovery were 149 days for belly tags and 147 days for opercle tags. However, when the fishing season ended on September 30, 1933, the belly tags were being returned at approximately the same rate as at the beginning of the season so that the recovery of more 1933 tags is confidently expected in 1934.

The tagging experiments represent the first successful attempt at tagging a clupeoid fish, and it is likely that this method can be applied to the sardine, the menhaden, and other clupeoids.

#### INVESTIGATIONS CONCERNING THE PROTECTION OF MIGRATORY FISH AT POWER DAMS ON THE COLUMBIA RIVER

*Grand Coulee Dam investigation.*—It is proposed to construct a dam approximately 370 feet in height across the Columbia River at the Grand Coulee. This site is some 140 miles upstream from the Rock Island Dam and approximately 150 miles south of the Canadian border.

J. A. Craig and Harlan B. Holmes were detailed to make a study of the possible effect of this dam on the salmon and trout of the Columbia River. The number of salmon and steelhead trout passing over the Rock Island Dam were counted from July 21 to August 27, inclusive. A survey was then made of the spawning streams between Rock Island and the Grand Coulee site so that an estimate of the number of fish spawning between the two locations could be made. All available data were collected on the magnitude of the runs at points above Grand Coulee. From these data it was estimated that the run which would be intercepted by the Grand Coulee Dam may be as small as 5,000 to 15,000 chinook salmon and an undetermined number of steelheads.

Recommendations for the protection of these runs were submitted to the Fish and Game Commissions of Washington and Oregon for

their approval. Because of the great height of the dam with its consequent danger to downstream migrants, it was felt that provision should be made to capture upstream migrants, spawn them artificially and liberate the offspring below the dam.

*Bonneville Dam fishway investigation.*—As a part of its public works program, the Federal Government is constructing on the Columbia River at Bonneville, Oreg., a dam to generate electric power and facilitate navigation. This dam will intercept annual runs of salmon, trout, and other fish valued at several million dollars a year. The passage of these fish over the Bonneville Dam will involve the greatest problem of fishway construction that ever has been attempted. It is unfortunate that past experience with fishways for a great part has not been satisfactory and we cannot point with assurance to devices that can be relied upon to pass this large mass of migratory fish over the dam.

A portion of the funds allotted to the construction of the dam has been assigned to the Bureau of Fisheries for the purpose of devising means of passing the runs of fish. Harlan B. Holmes, who has been placed in charge of the work, is being temporarily assisted by experts in various of the engineering and biological phases of the work. The investigation is being conducted in close cooperation with the commercial fishery interests and Fish and Game Departments of the States of Oregon, Washington, and Idaho.

As the work has been in progress for only about a month, no results are available as yet. The investigation will involve a study of the statistics of the fishery for the purpose of determining the time and magnitude of the runs. All types of fishways that have been used or proposed are being carefully studied. Experiments are being conducted to determine if the fingerling salmon and trout will be injured in passing through the power wheels. In case it is deemed necessary to prevent the fingerlings from passing through the wheels, means of diverting their migration will be studied and suitable bypasses provided. A careful study will be made of conditions during the period of construction so as to assure free passage of the fish at that time.

#### GREAT LAKES FISHERY INVESTIGATIONS

Owing to the severe curtailment of the budget no field work of any kind was conducted on the Great Lakes during the calendar year 1933, with the exception of one small project carried on by a member of the Great Lakes staff during the period April 3–14 at Sandusky, Ohio. Efforts were therefore devoted entirely to working up in the laboratory the tremendous amount of data that had been accumulated during the field investigations in past years and to prepare them for publication. Fishery investigations on the Great Lakes, under the direction of Dr. John Van Oosten, are conducted from headquarters and laboratories furnished by the University of Michigan at Ann Arbor.

During the year Dr. Stillman Wright completed a voluminous report on "A limnological survey of western Lake Erie with special reference to pollution." This report covers a series of investigations begun by the State of Ohio in 1926 and completed in cooperation with the Bureau in 1930. The report includes sections on physical

limnology, chemistry, bacteriology, phytoplankton, zooplankton, bottom organisms, and pollution in its relation to the fisheries. After a detailed consideration of these various technical subjects it was concluded that pollution in the western part of Lake Erie was not the primary or controlling factor in the depletion of the fishery in this lake. Dr. Wright also studied a series of plankton collections taken by the Bureau's investigators from certain lakes in Alaska. Owing to curtailed appropriations Dr. Wright left the Government service on June 3 and was immediately engaged by the Government of Brazil to conduct limnological surveys in the northeastern part of that country.

Progress has also been made in the further analyses and compilation of the data secured during the chub-net investigation of Lake Michigan and the deep trap-net investigation of Lake Huron and Lake Michigan (for details see report for 1932). It is gratifying to report that on the basis of the data secured during the deep trap-net survey, important regulations were passed by the Legislature of the State of Michigan that will safeguard to a large extent the seriously threatened depletion of the valuable whitefish, especially in Lake Huron.

During 1933 the Bureau continued its cordial relations with the various Great Lakes States and provided them with considerable information and scientific data concerning the commercial fisheries. Many memoranda on various fisheries problems were requested by and prepared for officials of several conservation departments; and considerable assistance was also rendered them in preparing outlines for field investigations, in drawing up fishery regulations, and in furnishing expert testimony at public hearings called by legislative committees. In fact, the Bureau's office at Ann Arbor, Mich., served more or less as a clearance house in supplying the States with scientific information on the Great Lakes fisheries.

One important Great Lakes interstate conference should be referred to here. It was called at Chicago by the Director of the Conservation Department of Wisconsin on January 5, 1933, for the purpose of considering uniform regulations of the commercial fisheries of Lake Michigan. The meeting was attended by officials of the four States fronting Lake Michigan and of the Bureau. Excellent conservation measures were agreed upon at the conference, but these later failed of passage in the several States. In addition to this Chicago meeting, Dr. Van Oosten attended some 17 other conferences during 1933 largely in connection with fisheries legislation. He has also represented the Bureau at various meetings called for the purpose of drawing up a Great Lakes fishery code and has provided the basic conservation measures that are being considered for inclusion in this code.

#### FISHERY STATISTICS

In July 1933 the Bureau began an intensive statistical study of the commercial fisheries of the Great Lakes waters of the State of Michigan under the immediate supervision of Dr. Ralph Hile. Data in the form of monthly reports submitted by each licensed fisherman to the department of conservation furnished the material for the investigation. Each report contained a daily record of the

catch by species, the kind and amount of gear lifted, the length of time the gear was fished, and the location of the fishing grounds. The reports for the years 1927 and 1928 were by no means complete, but since the beginning of 1929 there has been available a virtually complete record of all commercial fishing activities in the State.

For the purpose of analysis of the statistical data the Great Lakes waters of the State of Michigan have been divided into statistical districts which, as far as possible, represent natural geographical divisions. There are 7 districts in Lake Superior, 11 in Lake Michigan, 6 in Lake Huron, 1 in Lake St. Clair, and 1 in Lake Erie. The analyses have been directed toward a study of fluctuations in the total catch and total intensity of the fishery and also in the relative abundance of the several important species from year to year and from one locality to another. Abundance is calculated in terms of yield per unit of fishing effort.

The use of identical types of gear in totally unrelated fisheries and important variations both from one region to another and from one time of year to another in the amount of time gear is fished before it is lifted have made necessary the development of special methods of analysis for the study of Great Lakes fisheries statistics. The former difficulty was met by an allocation of effort in the direction in which it was actually exerted, that is, a particular unit of gear is considered to have fished for a given species only when some quantity of that species is included in its catch. The latter of the above mentioned difficulties was obviated through the introduction of the time element in the computation of fishing effort. Thus the fishing effort represented by a day's lift is not merely the amount of gear lifted, but rather is the product of the amount of gear lifted and the time the gear has fished. The sum of these separate products can be considered to represent the true fishing intensity for a given district or a given period of time. A detailed explanation and justification of these methods has appeared in a special publication.

At the present time the statistical studies are being confined chiefly to Lake Huron. In the near future a report will be prepared on the statistics of the commercial fisheries of that lake for the 5-year period, 1929-33.

#### PIKE-PERCHES

H. J. Deason was detailed to make a brief survey of the commercial lifts of trap nets operated during the period, April 3-14, 1933, in the vicinity of Sandusky, Ohio, and the islands of western Lake Erie. Particular emphasis was placed on the percentage of illegal saugers taken in these nets. Counts were made in the field of all legal and illegal saugers, yellow pike-perch, and yellow perch taken in 104 commercial trap nets operated at Sandusky, Put-in-Bay, and Toledo. Many saugers were also weighed, measured, and sexed at these three localities.

In addition much work has been done on the life history studies of the pike-perches of Lake Erie. A publication on these species was completed and presented at the annual session of the American Fisheries Society. It was observed that dominant age-groups occurred in the collections made in 1927 and 1928. The 1926 year class was dominant in both collections in the case of the yellow and

blue pike-perch, and probably also of the sauger. Comparing the growth rate of the three species of pike-perches it was found that the yellow pike-perch ranks first in the rapidity of growth, sauger ranks second, and the blue pike third. The sauger, however, becomes sexually mature at a smaller size than does the blue pike-perch and the latter matures at a smaller size than does the yellow pike-perch.

A study of the relationship of percentage of immaturity to the existing legal size limits now in force in Lake Erie indicates that the present size limits of all three species of pike-perches should be increased to afford better protection to spawning females. In order to help insure spawning by females at least once, a size limit of 15 inches total length is indicated as a minimum for yellow pike-perch. On a similar basis, a minimum of 13½ inches total length is recommended for blue pike-perch and a minimum of 12½ inches total length for saugers.

A report was also completed on the analyses of the stomach contents of the yellow pike-perch, sauger, and grass pike from Lake Champlain.

#### YELLOW PERCH

Studies of the life history of the yellow perch of the Great Lakes were continued. Scales from 2,434 fish were examined during 1933. Of these 2,434 scale samples, 1,095 were collected from western Lake Erie in 1929, 1930, and 1932; 513 were collected from Green Bay in 1932; 606 were collected from Saginaw Bay in 1929 and 1930; and 220 were collected by the University of Michigan Museum of Zoology during different years. Growth rates have been calculated for all except the Saginaw Bay collections.

Although detailed comparisons have not been made as yet, the growth rate of the fish from Green Bay appears to be very similar to that found in Lake Erie. This conclusion refutes the argument of the Green Bay fishermen of Wisconsin that the perch in their waters are dwarfed in growth and that therefore a small size limit on this species in Wisconsin waters is justified and necessary. The Lake Erie collections of 1929, 1930, and 1932 when compared with the 1927-28 collections seem to show that the yellow perch has increased its growth rate somewhat after 1928. The yellow perch from Saginaw Bay appear to grow at a faster rate than those from Lake Erie or Green Bay.

To check the suspicion that more than one race of yellow perch inhabited Lake Erie, body depth measurements were compiled for 613 yellow perch collected off Lorain, Ohio, and for 114 yellow perch collected off Erie, Pa., both collections having been made in 1929. Slight differences in body depth were found between the sexes of a collection. The fish collected off Erie, Pa., were found to be somewhat slimmer bodied than those taken off Lorain, Ohio, but the difference was found to be so small that on the basis of these data it cannot be concluded that more than one race of perch exists in Lake Erie. Additional evidence will be sought in the comparative study of the growth rates of the yellow perch taken both from the western and eastern end of Lake Erie.

## COOPERATIVE INVESTIGATIONS OF WISCONSIN LAKES

For many years the Bureau has cooperated with the Wisconsin Geological and Natural History Survey in limnological investigations of both fundamental and practical value on the lakes of northern Wisconsin. The Bureau's share in the cooperative enterprise consisted of modest financial support, the planning and technical supervision being provided by Drs. E. A. Birge and Chancey Juday of the State organization.

In 1933 the Wisconsin Geological and Natural History Survey received financial assistance for these cooperative investigations from the United States Bureau of Fisheries, Wisconsin Conservation Department, Alumni Research Foundation, and Thomas E. Brittingham, Jr.

The Survey's Trout Lake Laboratory was opened on July 1, and work was continued until September 9. The physical, chemical, and part of the biological investigations were discontinued on August 31, but the plankton and fish researches were continued into September.

The field party consisted of the following individuals: H. C. Baum, E. A. Birge, S. X. Cross, A. D. Hasler, R. Hunt, C. Juday, R. R. Langford, W. E. Militzer, E. Schneberger, H. A. Schomer, John Schreiner, W. A. Spoor, and L. R. Wilson. Dr. V. W. Meloche of the Department of Chemistry spent the greater part of July and August at the laboratory making a special study of some of the chemical problems involved in the investigations. Nine of the 14 members of the field party were working on problems which had a direct bearing on the fish life of the lakes. In addition to the field party, R. J. Allgeier was engaged in making analyses of lake residues in the chemical laboratory of the University of Wisconsin.

In the earlier years of these investigations, a general survey of the lakes of northeastern Wisconsin was made; it included one or more visits to some 530 different bodies of water. This survey was made for the purpose of obtaining some idea of the physical, chemical, and biological status of the lake waters of this district.

The general survey was completed in 1930 and since that time the investigations have been limited chiefly to six lakes representing the different types found in the district. These studies have had as their main objective the physical, chemical, and biological conditions for fish life in these lakes; the work on the fishes themselves has dealt with the kind and quantity of food eaten by the various species, the number and kinds of parasites harbored by them, and the rate of growth of the more common species in the different lakes. During the summer of 1933 another fish problem was added to these, namely, the determination of the total fish population of some of these lakes. Such information is necessary for a study of the fish production and of the fish-carrying capacity of a lake. It will also serve as a basis for experimental work relating to the increase of the carrying capacity of a lake by the use of artificial fertilizers. It will also have a bearing on the problem of stocking a lake with fish.

The details of the program and the results of the year's work are not presented here because of lack of space but may be consulted in the regular reports of the Survey and in the following publications:



BERE, RUBY.

Numbers of bacteria in inland lake waters of Wisconsin as shown by the direct microscopic method. *Internat. Revue ges. Hydrobiol. and Hydrol.* October.

JUDAY, C. and E. SCHNEBERGER.

Growth studies of game fish in Wisconsin waters. Second Report, April. (Mimeograph form).

JUDAY, C. and E. A. BIRGE.

The transparency, the color and the specific conductance of the lake waters of northeastern Wisconsin. *The Wisconsin Academy of Sciences, Arts and Letters*, vol. 28.

MELOCHE, V. W. and T. SETTERQUIST.

The determination of calcium in lake water and in lake water residues. *The Wisconsin Academy of Sciences, Arts and Letters*, vol. 28.

TITUS, LESLIE and V.W. MELOCHE.

A microextractor. *Industrial and Engineering Chemistry*.

## OYSTER INVESTIGATIONS

During the year 1933, oyster investigations under the direction of Dr. Paul S. Galtsoff were continued in Massachusetts, Connecticut, North Carolina, Florida, Louisiana, and Washington. Investigation in Massachusetts and Connecticut, with headquarters at Milford, Conn., consisted in experimental studies on growth and fattening of oysters, and in observations on seasonal changes in the chemical composition of oyster meat. The United States Fisheries Laboratory at Beaufort, N.C., served as headquarters for oyster investigations in the South Atlantic States and Louisiana, where a series of surveys of oyster producing bottoms was made with the view of ascertaining their suitability for the cultivation of oysters. On the Pacific coast, investigations on cultivation of native oysters were carried out at Olympia, Wash. The work of the Bureau was greatly facilitated by the cooperation of the respective State authorities who supplied boats, labor, and laboratory facilities.

### GROWTH AND FATTENING OF OYSTERS

Observations and experiments on growth and fattening of oysters were carried out at Milford, Conn., and at Woods Hole, Mass., by P. S. Galtsoff, R. O. Smith, and V. L. Loosanoff. The Connecticut Shellfish Commission continued its cooperation with the Bureau in this research work, assigning the State boat *Shellfish* to assist in field work and providing laboratory facilities at Milford. During the cold season, the State boat was in dock, but field observations were continued through the courtesy of the Connecticut Oyster Farms Co., which provided a suitable boat and assisted in collecting samples. Laboratory work during the winter was carried out at the Osborn Zoological Laboratory of Yale University.

The research facilities at Milford have been materially increased by a construction of two concrete tanks which permitted experimental studies on artificial feeding of oysters and conditions increasing the productivity of the sea water. As a supplement to these experiments, several planktonic organisms were cultivated in the laboratories at Woods Hole, Mass., and Yale University. The purpose of the experiments was twofold; first, to determine the conditions which accelerate propagation of marine algae, thereby in-

creasing the food content of the water, and second, to determine the nutritive value of different forms in the oyster diet. Since the understanding of the natural sequence of seasonal changes taking place in the sea is prerequisite for a successful solution of these problems, observations were continued on changes in water temperature, chemical composition of sea water, plankton content, and growth and changes in the chemical compositions of oysters. Until the end of July 1933 samples were collected at three stations located in Long Island Sound. Since August 1, observations at 2 stations (lots 618 and 644) were discontinued, because oysters were moved by the owners of these lots to other locations.

The results of observations made at weekly intervals show that growth of the oyster continues throughout the year even when the organism is in a state of hibernation. During the year the average total weight of 4-year-old oysters, kept on experimental ground at Charles Island in Long Island Sound, increased from approximately 150 to 250 grams. The increase continued throughout the year, but there were two periods of accelerated rate of growth, one coinciding with the period of gonad formation in June-July, the second one occurring in October-November, at the time of the greatest accumulation of glycogen.

The weight of the oyster shell constitutes from 76 to 81 percent of the total weight of the organism, whereas the weight of its meat fluctuates between 8 and 13 percent. Spawning sharply reduces the weight of the meat from 13 to 8 percent of the total weight, but is immediately followed by a gradual recovery. The maximum weight of the meat was found to occur in November, just before the onset of hibernation. During the period of hibernation there is a gradual decrease in the relative weight of meat.

Simultaneously with the observations on oysters, samples of plankton and water were collected for biological and chemical analysis. Abundant material, accumulated in the course of the investigation, is now being analyzed.

#### PREDICTION OF SETTING IN LONG ISLAND SOUND

Observations on the development of the gonad, started in 1932, were continued in 1933. Samples of oysters, examined in May and June, showed that the amount of spawn to be discharged was far below normal. Oystermen were notified that poor setting was to be expected, and those who, upon receiving this advance information curtailed their planting operations, saved money because, true to our expectations, there was no setting in the largest section of Long Island Sound.

#### PROPAGATION OF DIATOMS FOR THE ARTIFICIAL FEEDING OF OYSTERS

Laboratory experiments on plankton as affected by various substances added to sea water were carried out by P. S. Galtsoff, R. O. Smith, V. Koehring, and V. L. Loosanoff. In the majority of the experiments, a pure culture of the small diatom, *Nitzschia closterium*, has been used, but attempts were made to isolate other forms which may be useful in artificial feeding of oysters. At present, the follow-

ing microorganisms have been isolated and their cultures are being continued in the laboratory: *Nitzschia closterium*, *Nitzschia* sp. (very small diatom from California), *Carteria* sp. (green alga, family Chlamydomonadinae), *Cromulina* sp. (greenish alga, order Chrysomonadinae), and an extremely small, pink microorganism not yet identified. The latter form was isolated from the samples collected on oyster beds in Great South Bay, where oysters developed unusually dark pigmentation.

By using various combinations of inorganic salts and organic substances, a method has been perfected whereby very dense cultures of diatoms can be obtained. At present, the richest culture growing in the laboratory contains 1,400,000 diatoms in each cubic centimeter of water. Under proper light and temperature conditions, this dense population can be maintained almost indefinitely by withdrawing every day a portion of the culture and replacing it with an equal amount of solution. It is intended to apply this method in producing large quantities of diatom cultures and in using them for artificial feeding of oysters.

#### THE USE OF SLAG IN OYSTER CULTURE

A series of experiments was performed with slag, a byproduct of the steel industry, which has been recently brought to the attention of oyster culturists as a material suitable for cultch. Experiments carried out at Onset and Wareham River, Mass., showed that oyster larvae readily attach to the surface of slag and grow well. Its presence in water may increase the productivity of oyster beds, because slag has been found not only to promote the growth of diatoms, but to maintain it for longer periods than in the control cultures. The presence of slag on oyster beds is therefore of double advantage, serving as a source of nutriment to the oyster food as well as material for the attachment of spat.

The growth promoting factors of slag may be extracted by repeated boiling in sea water—diatoms growing rapidly in the filtrate. Untreated slag lumps as they are received from the mills are highly favorable to growth. Some of the growth-promoting factors of slag seem to be removable by alcohol washing, as growth in cultures containing alcohol-washed slag, while more prolonged than the growth in the controls, is not so rapid as in cultures containing untreated slag.

#### OYSTER PLANTING IN NORTH CAROLINA

In order to rehabilitate the depleted natural oyster beds of this State, transplantation of seed oysters has been carried out under the direction of Dr. H. F. Prytherch, in cooperation with the North Carolina Department of Conservation and the Civil Works Administration. These operations have been conducted in 5 coastal counties where during December 1933 a total planting of over 272,000 bushels of seed has been made at an average cost of approximately 9 cents per bushel. In order to maintain production of the areas from which seed oysters have been obtained, large quantities of old oyster shells have been scattered over the bottoms to provide a place of attach-

ment for subsequent generations of this shellfish. The planting of seed oysters and shells will be continued during 1934, with funds provided by the Civil Works Administration. Up to the present time, this work has provided employment for 266 of the oyster fishermen of this section. Experimental oyster farming operations conducted by the Bureau during previous seasons have served as a guide in the selection of suitable planting bottoms and in the adoption of the most practical and efficient methods for the rehabilitation and future maintenance of this valuable natural resource.

At the Beaufort laboratory an improved method of opening clams has been developed by Dr. V. Koehring and Dr. Herbert F. Prytherch. It has been found that clams may be easily opened by immersing them in a warm bath of fresh or sea water having a temperature of 105° F. In these experiments 100 percent of the clams opened their shells in from 10 to 20 minutes and when removed from the bath a few minutes later were completely narcotized. The meats could then be removed with comparative ease and were alive and in as fine condition as if they were opened raw. This process is suitable for either the raw trade or canning of hard clams and will be tested on a commercial scale in the near future.

#### OYSTER INVESTIGATIONS IN FLORIDA

During April and May, extensive oyster farming operations were conducted by Dr. H. F. Prytherch in the region from Panama City to Pensacola in cooperation with the Florida Department of Conservation. Previous studies made by the Bureau in Choctawhatchee Bay disclosed a scarcity of old shells or suitable objects to which the spawn of the oyster might attach, and indicated the necessity of planting shells and seed oysters in this area to create and extend natural beds and utilize the barren bottoms that are suitable for cultivation of this shellfish.

A survey was made of the principal oyster producing areas in the Pensacola region including East Bay, Blackwater Bay, and Escambia Bay. Excellent conditions for oyster propagation and the production of a high grade marketable product were found in East Bay and recommendations were offered for the development of this region by transplantation of seed oysters from the natural beds in Blackwater and Escambia Bays. In the vicinity of Panama City serious depletion of the natural beds in North Bay and East Bay was observed. Rehabilitation and future maintenance of these can be accomplished by regularly restocking them with seed and shell and by enforcement of the cull law. An adequate supply of seed for this purpose was found on the overcrowded oyster reefs in nearby waters such as West Bay.

Biological studies of oyster spawning and setting were made in all the previously mentioned waters which showed that shell planting operations should be carried out during April and May.

#### OIL POLLUTION INVESTIGATIONS IN LOUISIANA

At the request of the Louisiana Department of Conservation the Bureau has undertaken an investigation to determine the cause of

the recent oyster mortality in Terrebonne Parish and its possible relation to oil-well pollution of these waters. Oyster planters operating in the vicinity of the oil wells in Lake Pelto and Lake Barre suffered a heavy loss of their stock during the winter of 1932-33 and to a lesser degree during the previous winter.

A preliminary survey of this region by Dr. Prytherch in May 1933 showed that 50 to 95 percent of the adult oysters on the planted beds, had died previously but no direct relation could be established between the degree of mortality on these areas and their distance from the oil wells. Pollution of the water by oil, brine effluent, and gas ( $H_2S$ ) was greatest in the vicinity of the Lake Barre wells, and yet live oysters were found on the piling of these wells and on a natural bed in their immediate vicinity.

The problem is further complicated by the fact that the mortality was limited chiefly to the larger oysters and that the natural enemies, the boring sponge and boring clam, which heavily infested most of their shells, were apparently unaffected under the same conditions. A severe attack of these enemies lowers the vitality of the oyster and it is believed that such a condition was an important contributing factor in the mortality of many of these oysters.

On several beds, however, a high death rate occurred where there was no evidence of the boring sponge or clam. Fortunately it was possible to obtain samples of weak surviving oysters from these areas and others for microscopical studies, which have subsequently shown that the tissues of the muscle and gills were heavily infected with a minute protozoan parasite. Studies are being continued of the life history and occurrence of this protozoan parasite in Louisiana oysters and its possible relation to recent mortality.

#### EXPERIMENTAL STUDIES OF OIL-WELL POLLUTION

Since pollution of the waters of Terrebonne Parish was coincident with the oyster mortality, it was necessary that laboratory experiments be conducted to determine whether the different polluting substances, crude petroleum, brine water and hydrogen sulphide, are toxic to oysters and other marine animals and in what concentration. At the Beaufort Laboratory this work has been in progress since July and has shown that (1) oysters, clams, and numerous marine invertebrates will survive and grow in water covered with a heavy film of crude petroleum; (2) shellfish are not killed when fed on suspensions of these oils and show no cessation in growth of shell; (3) oysters survive when completely immersed in oil once each hour over a period of 6 weeks; and (4) oysters and clams will grow on mud and sand bottoms saturated with different grades of oil. These experiments are being continued.

The most serious pollution from the oil wells is apparently the brine water extracted from the petroleum. The effect of the different brines on feeding, growth, and shell movements of the oyster are being investigated. Though small amounts have been found to be nontoxic to larval, spat and adult oysters over a short period of time, general conclusions cannot be drawn until the effects over a prolonged period have been determined. Dilute solutions of brine of the same salinity, pH, and oxygen content as sea water were found to be toxic to oysters and produced death in from 6 to 10 days.

## OYSTER INVESTIGATIONS IN WASHINGTON

Investigations on the spawning and setting of the native oyster of the Pacific coast were continued at Olympia, Wash., under the direction of Dr. A. E. Hopkins. Accurate records have been kept during 3 seasons of the 2 most important oyster-producing bays near Olympia, and in 1933 similar observations were made in 2 additional bays. The results already are being employed by oyster growers to assist in determining the correct time to plant cultch for the collection of seed. Owing to the short summer in 1933 the setting season was only about half as long as in the 2 years preceding. While in 1932 between 160 and 170 broods of larvae were produced per 100 adults, showing that most of them spawned twice, in 1933 only about 75 percent produced broods during the entire season. The number of larvae released in 1933 was less than half as great as in the previous year, thus limiting the possible catch of seed.

In Oyster Bay spawning started just after the middle of May, but the larvae did not begin to set until July 3. As in the last 2 years, definite periods of setting occurred, as shown by counts of spat caught on shells planted at frequent intervals. Although there is considerable variation in the results for the 3 seasons studied, it appears that there are characteristically, in this bay 2 distinct setting periods: The first, at the beginning of the season, and the second, about 5 to 6 weeks later. In addition, secondary periods may occur either between or after these two. Results from two other bays, Oakland Bay and Little Skookum, studied in 1933, agree closely with Oyster Bay in time of occurrence and relative intensity of the setting periods.

On the other hand, Mud Bay, which has been studied extensively, appears to be entirely different with respect to spawning and setting, although there is little difference in the temperature and salinity of the water. In 1933 there was only 1 setting period, beginning July 25 and continuing for about 3 weeks, after which no setting of any importance could be observed. This appears to represent the typical season in this bay, for it is usually unsatisfactory as a producer of seed.

The time required for setting of larvae after their release into the open water appears to vary considerably from year to year and in different bays. From the time of beginning of spawning until the first spat were found there was in Oyster Bay in 1932 a period of 39 days while in 1933 it was 47 days. In each year 4 days longer were required in Mud Bay. Presumably this time depends upon environmental factors as yet not thoroughly understood.

The occurrence of periods of setting appears not to depend primarily upon corresponding spawning but upon tidal cycles. Analysis of the records of setting in all of the bays studied shows that setting periods occur during runs of extreme tides. Preliminary experiments were made to determine what factors favorable to setting are controlled by the tidal cycles, but with inconclusive results.

Experiments on the effect of changes in salinity on the feeding activity of the Pacific oyster were continued. It was found that if the salinity is reduced from about 28 to about 15 per mille adapta-

tion is extremely slow, requiring many days, while a change from a lower to a higher salinity permits recovery within a few hours. It is probable that adaptation to such a low salinity is not so complete that feeding may continue as rapidly as in the higher salinity. If placed in water of a salinity of about 10 per mille, feeding appears to cease completely, though the shell may remain open and shell growth continue. Specimens have been kept in this low salinity for as long as two weeks without any indication of adaptation of the feeding mechanism, and even after being returned to more favorable water recover only very slowly. It is thought that these results will throw considerable light upon the problem of locating oyster beds in places where the oysters will fatten properly.

#### INVESTIGATIONS ON AQUICULTURE

The investigations originally undertaken in connection with fish cultural operations at the hatcheries have been expanded recently to include field studies dealing with the many and diverse factors which affect fish in their natural environment. This is a logical expansion of the work, since it is obvious that the welfare of the fish after being liberated in natural waters is fully as important as the efficient operation of our hatcheries. It is evident that no matter how successful our hatchery operations may be, the success or failure of artificial propagation in terms of catchable fish is determined eventually by conditions in the streams or lakes in which the fish are planted.

The experimental hatcheries at Leetown, W.Va., and Pittsford, Vt., are fortunately situated to serve as headquarters for field investigations, since each is located in a region noted for its excellent fishing. Within a short distance of the Pittsford station in the heart of the Green Mountains, there are many famous trout streams, while both trout and bass waters are readily accessible from the Leetown station. Extension of these field studies will be greatly accelerated by an allotment from the Public Works Administration for stream surveys and stream improvement work during the summer of 1934.

In addition to the field work, investigations dealing with the various fish-cultural problems are being conducted as in the past. This work is conducted under the general direction of Dr. H. S. Davis.

#### POND-FISH CULTURE

Owing to drastic reduction in the Bureau's appropriations, all experimental work at the Fairport station was discontinued on July 1, 1933, when Dr. A. H. Wiebe, formerly in charge of this station, severed his connection with the Bureau. Consequently the only investigations during 1933 on the propagation and rearing of bass were carried on the Natchitoches (La.) station. These investigations were conducted by O. Lloyd Meehan and were a continuation of those carried on at the Tishomingo (Okla.) station during the summer of 1932. This transfer was deemed advisable on account of the better facilities for experimental work afforded by the Natchitoches station.

The experiments at Natchitoches afford the most clear-cut evidence of the influence of fertilization on fish production that has yet been obtained. The results show that both the number and size of the fish produced in a pond are directly proportional to the amount of fertilizer added. The results from 7 ponds, each with an area of approximately 0.85 acre, are available for comparison. Three of these ponds were fertilized with cottonseed meal at frequent intervals during the spring and early summer. A fourth pond received 1½ tons of cow manure at the beginning of the season. The other 3 ponds were unfertilized except for a small amount of cow manure early in the spring. The pond which received the largest amount of cottonseed meal (905 pounds) produced 12,245 fingerling bass per acre, which was the largest production obtained from any pond. A second pond, fertilized with 685 pounds of cottonseed meal, produced about 11,000 fingerlings per acre. The third pond received only 498 pounds of cottonseed meal and produced approximately 6,400 fish per acre. The pond which was heavily fertilized with cow manure early in the season produced only 2,941 fish per acre. The unfertilized ponds with one exception produced less than 3,500 fingerlings per acre.

The growth of the fish in the ponds fertilized with cottonseed meal was in direct proportion to the amount of fertilizer added. The pond which received the smallest amount of fertilizer produced the fewest and smallest fish. The pond fertilized most heavily and for a longer period than the others produced the largest fish and also the greatest number per acre. The fish from unfertilized ponds were not only fewer but smaller than those from fertilized ponds.

It is a noteworthy fact that the fish from the unfertilized ponds made much of their growth early in the season, since these fish were as large on May 24 as the others on July 25, just 2 months later. It is also of interest to find that fish in the fertilized ponds stopped growth shortly after fertilization was discontinued early in the summer.

As might be expected, a direct correlation was found between the number of food organisms in a pond and the amount of fertilization. It appears that the weed and bottom habitats are about equally important in the production of food organisms. This is of interest in connection with the control of aquatic plants in ponds.

Experiments with sodium arsenite were conducted to determine the relation of pH and alkalinity to the amount of the chemical to be used for the control and extermination of weeds in various waters. It was found that these are not the only factors affecting the results, since some other interfering substance is important in influencing the amount of sodium arsenite required. No information as to the nature of this substance has yet been obtained, but it is evidently something outside of those tested for regularly, since the difference in treatments could not be correlated with any of these.

It was also found that in order to make the sodium arsenite treatment effective it was first necessary to control the algae. This was best accomplished by a thorough mixing of copper sulphate in the surface water by agitation of the bag containing the chemical.

Investigations regarding the possibility of using fresh-water shrimp (*Palaemonetes*) as a forage food in bass ponds indicate that



this will not be feasible under present conditions. These animals are not adapted to transfer from one habitat to another, while their small size makes them easy prey for the fish, resulting in almost total loss of brood stock. Shrimp are very sensitive to differences in pH and quickly die when transferred to waters showing a material difference in this respect from their original habitat. This is true even though the water may have an abundant supply of dissolved oxygen.

#### TROUT CULTURE

*Feeding experiments.*—As in 1932, feeding experiments were carried on at the Pittsford (Vt.) station under the direction of R. F. Lord and at the Leetown (W.Va.) station under the direction of E. W. Surber. Both brook and rainbow trout were used in these experiments. Several lots of Loch Leven fingerlings were also carried on experimental diets at the Leetown station.

Since previous experiments have demonstrated conclusively that better results can be obtained when certain dry products are included in the diet than by feeding fresh meats alone, the experiments in 1933 were primarily designed to determine the level at which these dry products can be fed most efficiently and economically. Unfortunately, owing to the limited funds available for experimental work, it was necessary to discontinue the experiments at both stations early in September.

As has been emphasized in previous reports, there is no dry product available commercially which can be fed to trout successfully for any considerable length of time without the inclusion of raw meat in the diet. With large fingerlings and older trout only 15 to 25 percent of raw meat is required to keep the fish in healthy condition. Unfortunately, mixtures containing such a small percentage of meat cannot be fed without considerable waste and it is consequently more economical to include a larger amount of raw meat than is necessary for the well being of the fish. The meat not only makes the ration more palatable to the fish but serves as a binder to hold the fine particles of meal together so they can be eaten readily. When the proportion of the meat is too small, the mixture quickly disintegrates in the water and much of the dry food is lost.

As in previous years, salmon-egg meal gave the best results of any dry product used, although, with regard to growth, there was very little difference between this product when used alone and a mixture of equal parts salmon-egg meal and a good grade of meat meal. Meat meal alone was somewhat inferior to salmon-egg meal.

The results of the experiments show that as high as 60 percent of dry meal may be economically incorporated in the diet. For instance, one lot of yearling rainbow trout, on a diet composed of 60 percent salmon-egg meal and 40 percent raw pig liver, gained 153 percent in weight from June 7 to September 1, while a second lot, on a diet composed of equal parts pig liver and salmon eggs, showed an increase of only 143 percent during the same period. The conversion factor was slightly better when the larger amount of salmon-egg meal was used, since it required 2.1 pounds of food to produce a pound of trout when this product was fed at a 50 percent level, and only 1.9 pounds when fed at a 60 percent level. When the dry con-

stituent of the diet is still further increased, the mixture disintegrates so readily that it is very difficult to feed without considerable waste.

Since it is a universal practice to feed rapidly growing fish all they will eat, experiments were run at both the Pittsford and Leetown stations to determine if a reduction in the amount of food would result in its being utilized more efficiently. The results are inconclusive, although indicating that probably a somewhat greater efficiency can be obtained by feeding slightly less than the fish will consume readily. In the case of brook trout fingerlings, 2.4 pounds of food were required to produce a pound of fish on a diet of beef liver and salmon-egg meal when the fish were fed all they would eat readily. In another lot of trout on the same diet but given 25 percent less food than the former lot, 2.3 pounds of food were required for each pound of fish produced. Rainbow fingerlings made a better showing, since the amount of food required to produce a pound of fish was 2.8 and 2.1, respectively. In the case of brook fingerlings at the Leetown station on a similar diet, 2.57 pounds of food were required for each pound of fish produced, when the fish were given all they would eat, and 2.67 pounds when fed 25 percent less. The rainbow fingerlings again made a much better showing. In this case 2.58 pounds of food were required for each pound of fish produced when the fish were fed all they would eat, while only 2 pounds were required when the amount of food was reduced 25 percent.

With rainbow yearlings at the Pittsford station, a reduction of 10 percent in the amount of food in the case of fish fed a mixture of equal parts of pig liver and salmon-egg meal, resulted in 1.8 pounds of food to 1 pound of trout as compared with 1.9 pounds in fish fed the larger amount. When fed pig liver a considerably larger amount of food was required to produce a pound of fish, when the amount was reduced 15 percent, 10.6 pounds being required when the fish were fed the full amount and 13.7 pounds on the reduced diet.

It is scarcely necessary to point out that the growth on the reduced diets was considerably less in every case than that of fish fed all they would readily consume. It should be emphasized, however, that in no case were the fish overfed. The fingerlings were given only as much food as they would readily eat twice a day, while the yearling trout were fed only once a day.

In an effort to clear up some of the uncertainty regarding the amount of food required to support trout in nature, a number of brook and rainbow trout fingerlings at the Leetown hatchery were kept on natural food from May 3 to October 12. The food of these fish consisted principally of the water sawbug (*Asellus*) with some gammarus and a few snails. A supply of these organisms was kept in the troughs at all times so that the fish had all they could eat.

Within 3 weeks after the experiment was started, the color of these fish was noticeably brighter and within a short time they became the most highly colored fish at the station, in fact, the colors were much more intense than those of the average wild trout.

At the end of the experiment the average individual weight of the brook trout was 33 grams and of the rainbow trout 34.5 grams.

It was found that in the case of brook trout 6.9 pounds of food were required to produce a pound of fish, while with the rainbow trout 7.4 pounds were required to produce the same amount. On a dry basis it required approximately 1.86 pounds of food to produce 1 pound of fish in the case of the brook trout and 2.05 pounds in the case of the rainbow. The less efficient use of food by the rainbow trout may possibly be caused by the greater activity of this species.

*Selective breeding.*—Experiments in selective breeding of brook trout were continued at the Pittsford station along much the same lines as in previous years. As pointed out in some detail in the report for 1932, rigid selection for two generations has resulted in a notable increase in rate of growth and egg production. In fact, the improvement in these respects has been much greater than it was thought could possibly be accomplished in such a brief time. In view of the success of these experiments at Pittsford, the same methods of selective breeding are being extended to rainbow and brown trout at the Leetown station. This is the first season trout have spawned at this station, the oldest fish being only 2 years old.

In order to obtain a fair comparison of the growth of selected and nonselected fish, three lots of brook trout fingerlings were reared at the Leetown station under as nearly identical conditions as possible with respect to food and water supply. Each lot, containing 1,200 fingerlings, was placed in a standard hatchery trough on March 1, where the fish remained until the experiment was discontinued. Two lots of fish were from eggs taken at the York Pond (N.H.) station. One lot of these eggs was from fish which had been reared from wild trout; the second lot from fish still farther removed from the original wild stock. The third lot of eggs was taken from selected stock at the Pittsford station.

From the beginning of the experiment the fish from the Pittsford station grew more rapidly than those from the York Pond station. There was practically no difference in the growth of these two lots of fish. The experiment was discontinued in August when the fish in each lot were 29.5 weeks old. At this time the average individual weight of the Pittsford fish was 11.5 grams. The weight of one lot of York Pond fish was 4.9 grams and the other lot 4.6 grams. There was also a marked difference in mortality, which in one lot of York Pond fish totalled 718 and in the other 546. The loss among the Pittsford fish was only 169 during the same period. The mortality in all three lots was abnormal, but no attempt was made to correct it by treatment of any kind. The higher mortality among the York Pond fish should have given them the advantage with respect to growth so the fact that the Pittsford fish grew almost twice as fast is all the more notable.

*Hatchery technique.*—In an effort to determine the number of young trout which can be handled most economically in hatchery troughs, four troughs at the Leetown station were stocked with rainbow fingerlings as follows: Trough no. 1 received 500 fish; trough no. 2, 1,000 fish; trough no. 3, 2,000 fish, and trough no. 4, 3,000 fish. These fish were all from the same lot, with an average weight of approximately 1 gram at the beginning of the experiment. All 4 lots of fish grew at about the same rate until April 26 when the

fish in no. 4 trough were found to weigh approximately 0.3 gram less than those in the other troughs. From this time on the slower growth of the larger lots became more and more noticeable, until on July 10 it was necessary to discontinue the lot in trough no. 4 on account of an outbreak of bacterial gill disease.

The average individual weight of the fish in each lot on July 5 was as follows: Trough no. 1, 14.26 grams; no. 2, 13.27 grams; no. 3, 11.15 grams; and no. 4, 8.89 grams. The mortality up to the time of the outbreak of the gill disease in trough no. 4 was in all cases too small to be of any significance. The results show clearly that overcrowding not only retards the growth of the fish but also increases their susceptibility to disease.

A series of experiments were carried out at the Leetown hatchery to determine the amount of oxygen removed from the water in troughs containing various numbers and sizes of fingerling trout. The complete results cannot be given here, but a few examples may be of interest. The troughs were supplied with water having a temperature of 54° F. at the rate of 5.17 gallons per minute. In one trough containing 1,500 brook trout with an average individual weight of 13.45 grams, 5.78 parts per million of oxygen or 60.02 percent of the total amount in the water was removed by the fish. In another trough containing 20,461 rainbow fingerlings with an average individual weight of 0.24 grams, the amount of oxygen removed was only 1.4 parts per million or 12.5 percent of the total amount. In a third experiment 3,900 black spotted trout fingerlings, averaging 2.33 grams in weight, removed 1.88 parts per million of oxygen, or 18.02 percent of the total amount present.

Feeding greatly increased the consumption of oxygen, as shown in the case of a trough containing 1,500 brook trout, with an average weight of 13.45 grams. On the morning of November 28 after these fish were fed 300 grams of food, 7.26 parts per million of oxygen were consumed in this trough. At 4:05 p.m., several hours after feeding, the consumption of oxygen in the same trough was only 4.72 parts per million, or 44.74 percent. At this time the fish were again given 300 grams of food, and the oxygen consumption rose to 8.55 parts per million, or 81.04 percent of the total amount present. It is evident from these experiments that in overcrowded troughs there is a distinct possibility that during or shortly after feeding the oxygen content of the water may drop to dangerously low levels even though at other times the supply may be more than sufficient for the needs of the fish.

A self-cleaning device for use in circular pools has been developed by Mr. Surber, which it is believed will greatly simplify the operation of this type of pool. The device consists of a large sleeve, which is attached to the outlet pipe and extends for a short distance above the surface of the water. At the bottom there is a small opening between the sleeve and a sloping flange which rests on the bottom of the pool. The width of this opening can be easily adjusted according to the size of fish in the pool. Excrement and waste material are drawn through the opening by the water flowing through the outlet pipe, thus automatically keeping the pool clean and in good sanitary condition.

*Field studies.*—A quantitative study of rainbow trout production in a small spring-fed stream near Leesburg, Va., was made by Mr. Surber. This stream has been turned over to the Bureau by the owner for experimental purposes, and all fishing except by authorized persons is prohibited. Trout are prevented from leaving the stream by a revolving screen at the lower end. However, owing to severe floods, the operation of the screen during the fall and winter of 1932-33 was so spasmodic that it is believed that the screen had little effect in retaining the fish.

A total of 49 pounds of fish, over 7 inches long, were removed from the stream during the season, or an average annual production of approximately 30 pounds per acre. It is known that a number of large trout were left in the stream so that the total production was undoubtedly somewhat greater. A study of the stomach contents of these fish shows that although amphipods and aquatic insects were abundant, the trout during the summer fed almost entirely upon terrestrial insects.

In connection with the field work at the Pittsford station, an arrangement was made with the Middlebury College, Middlebury, Vt., for the development of a program for improving trout fishing in the streams under the control of the college. Most of these streams are in the Battell Forest, a beautiful tract of over 30,000 acres, located on both slopes of the Green Mountains. Owing to the limited funds and personnel available for this work during the summer of 1933 it was only possible to make a preliminary investigation of the more important streams in the forest. A more complete study of the streams to be followed by a systematic program of stream improvement will be undertaken in 1934.

During the summer of 1932 a number of marked yearling brook trout were liberated in an excellent trout stream adjoining the hatchery grounds at Pittsford to determine if domesticated fish could care for themselves under natural conditions as well as wild fish and also if they would afford equal sport to the angler. The results were of such interest and value as to suggest the advisability of conducting a similar experiment with rainbow trout. Accordingly, on September 3, 1933, 100 marked yearling rainbow trout were set free in the same section of the stream in which brook trout had been liberated the previous year.

Observations made on these fish shortly after they had been liberated showed a much greater tendency to scatter than in the case of the brook trout. They were also more difficult to take on fly and on only 1 day during the course of the experiment was it found possible to capture the desired daily quota of 10 fish. Fishing was continued with varying intensity up to September 26. During this period the total number of marked fish taken was only 49, and in order to capture this number it was found necessary to resort to bait in a number of instances.

In general the rainbow trout reacted quite differently from the brook trout in the previous experiment. Especially noteworthy was the much greater tendency to move downstream with the current. For example, 59 percent of the fish recaptured were taken below the pools in which they had been liberated; 29 percent from the pools

themselves; and only 13 percent had moved upstream from the point of liberation. On the other hand, in the case of the brook trout, 61 percent were taken upstream from the pools where liberated; 23 percent from the pools themselves; and only 16 percent had moved downstream.

Complete observations on this experiment will not be available until after the freshets in the spring of 1934, but it has already shown conclusively that hatchery reared rainbows, as well as brook trout, are fully able to care for themselves when thrown on their own resources.

*California trout investigations.*—The investigations of problems relating to the trout of California were carried on with the same personnel as in 1932. As a result of experience gained during the past year, it has been decided to modify in several important respects the program originally adopted for the investigations. Briefly the program as now developed calls for intensive work on two major projects with additional work on several minor projects, which will be carried on as time permits. One of the major projects which is concerned with trout problems relating to Sierran lakes and streams is under the immediate supervision of Dr. P. R. Needham, who is also in charge of the California investigations as a whole. The other major project is under the immediate direction of A. C. Taft and deals primarily with problems relating to sea-run steelheads. This project includes extensive studies in several coastal streams with especial attention to the Klamath River.

The minor projects include the planting of large numbers of marked trout in the Truckee River and Angora Lake, experiments in developing selected strains of California trout at the Hot Creek rearing ponds in Mono County, and the development of a stocking policy for water reservoirs near San Diego.

Work on environmental conditions in trout streams carried on during the past year has brought to light a number of new and interesting facts. Seasonal food studies made in Waddell Creek near Santa Cruz in August, November, March, and May, give a yearly average of approximately 198 pounds of insect food per acre of riffle area. Pools produced only 54 pounds per acre. On the other hand, Waddell Creek Lagoon averaged over 250 pounds per acre. While this stream produces principally insect food above the brackish water area, lagoon foods consisted almost entirely of crustaceans, of which 2 amphipods, *Gammarus confervicolis*, and *Corophium spinicorne*, and 1 isopod, *Exosphaeroma oregonensis*, offer abundant food to young salmonoids. In numbers, an average of over 10,000 crustaceans were found per square meter in the lagoon bottom, while the riffles in the stream above averaged only about 6,500 organisms to the same area.

In the Feather and Merced Rivers about the same amount of food was found to be present in winter as in summer, slightly more being present in winter. Streams in northern California, both coastal and Sierran, were found to be much richer in food than Sierran and coastal streams in the central and southern parts of the State.

The steelhead studies started at Waddell and Scott Creeks in 1931 have been continued. These two streams which are small in size and very similar in physical characteristics offer particularly

favorable conditions for experimental work. One stream, Scott Creek, has been closed for years by an impassable dam near its mouth where all ascending steelhead are trapped and spawned. During the past summer a dam was constructed on Waddell Creek which will automatically trap all adult fish migrating upstream and will also capture a portion of the downstream migrants. In this stream the adult fish, after being measured and tagged, will be allowed to proceed upstream and spawn naturally. It is hoped in this way to obtain, among other things, accurate data on the comparative efficiency of natural and artificial propagation.

During the period January to May 1933, 82 adult steelhead trout of the 614 tagged the previous year returned to the station on Scott Creek. These fish had been tagged on the gill cover with a no. 3 strap tag. Of these 82 fish 61 percent returned carrying the tag, and the balance were recognized by the hole in the abraded area where the lost tag had been attached. During the same period 368 fish were tagged after spawning, including the fish previously tagged. On these fish the celluloid disk tag attached by a nickel wire just below the base of the adipose fin was used. In addition to the work on the adults, 11,000 yearling fish were marked and planted in the lagoon.

Some field work was done on the Klamath River during the summer, and arrangements were made to hold fish in the Fall Creek hatchery for marking experiments during the coming spring. It is planned to expand the work on the Klamath considerably during the coming year.

#### FISH DISEASES

Studies of the bass tapeworm at the Fairport (Iowa) station, started in the summer of 1932 by Dr. Frederic F. Fish, were continued during the spring of 1933. These investigations show that this tapeworm has not caused serious injury to the bass at Fairport.

A detailed study of the causes underlying the heavy loss of bass fry in the nursery ponds indicated that protozoan parasites, particularly *Cyclochaeta*, are largely instrumental in causing such losses, and it was concluded that as a routine practice all fish should be dipped in a salt solution before they are placed in ponds. It was also found that smaller quantities of fry should be handled during the process of counting and weighing than has been the practice in the past.

Later in the season Dr. Fish made an investigation of a trout disease at the Cortland (N.Y.) station which caused a heavy loss among the fingerling trout. The disease is characterized by external lesions not unlike those of furunculosis and consequently has apparently been confused with it. However, detailed studies of the pathology of the disease show very clearly that it is quite distinct from furunculosis. Like furunculosis, it is highly pathogenic to many species of trout and has apparently caused serious losses at several hatcheries in New York State. The disease is evidently of bacterial origin, and several species of these organisms were isolated from the tissues. Although one of the organisms isolated from diseased fish is pathogenic to trout, it has not yet been demonstrated that it is the primary cause of the disease.

One of the greatest objections to the use of rearing ponds for trout fingerlings is the difficulty of treating the fish should they develop an external infection, such as gill disease. Removal of the fish and dipping by the methods now in general use is a laborious process and also results in many fish being severely injured by handling.

A method of treating fish in pools by allowing a chemical solution to flow into the pools at a uniform rate has been developed by Dr. Fish. The essential part of the device is a floating siphon, the proper concentration of the chemical in the pool being obtained by adjusting the strength of the original solution to the volume of flow. This is a very simple device and can be readily adapted to almost any type of pool. In this method the fish are treated for a considerable length of time with a very weak solution, which at the concentrations ordinarily used in the so-called "dipping method", would prove fatal in a few minutes.

A very efficient cure for bacterial gill disease has been developed at the Leetown station by Eugene W. Surber. This consists of treating the fish with chlorine gas dissolved in water at a concentration of 1 to 2.5 parts per million. Since this solution is quickly fatal to fish, the chlorine must be neutralized by the addition of sodium thiosulphate after 1.5 to 2 minutes. This treatment has been used with great success in circular pools and also in hatchery troughs. It has not yet been tried in other types of pools, but there appears to be no reason why it could not be successfully used wherever there is a rapid circulation of water.

#### COOPERATIVE STUDIES OF THE NUTRITIONAL REQUIREMENTS OF TROUT

Investigation of the problems connected with the feeding of trout in hatcheries, which were begun during the summer of 1932, have been continued during 1933 by Dr. C. M. McCay and A. V. Tunison at the Bureau's fish cultural station near Cortland, N.Y. This is a cooperative project conducted under an agreement between the U.S. Bureau of Fisheries, the New York Conservation Department, and the New York College of Agriculture at Cornell University. Special attention has been given to the nutritional problems as well as to the actual feeding experiments, in order to extend our knowledge of the principles of trout feeding beyond that obtained from the Bureau's older experiments of a practical nature in the same field. During the year the hatchery equipment has been altered and improved and electric power is now available. The latter is of considerable importance, since it provides means of controlling the physical environment of the fish that is essential in certain experiments and reflects the general tendency in all nutrition laboratories toward a better appreciation of the importance of such control.

While the work of the investigators was confined as far as possible to the field of nutrition, attention was given to the prevention of disease. Deficient diets inevitably lead to disease which may manifest itself as a distinct alteration in the anatomy and physiology of the trout, or may result in a secondary invasion of the sick fish by parasites; all of which tends to confuse the results obtained from experiments in nutrition. Moreover, the cure of disease may often lie in the hands of the nutrition student. Hence, the practice



has been followed of treating the trout in the Cortland hatchery at weekly intervals, thus preventing to a large degree epidemics that otherwise would interfere with the experiments. Care has also been exercised to prevent the introduction of disease by importations of trout or eggs from various sources during the year. Moreover, in order to avoid the needless complication of iodine deficiencies in experimental diets, the practice has been followed of including in the rations each day from 0.1 to 0.2 milligram of potassium iodide per kilogram of live trout.

The major activities of the station were concerned with numerous experiments in three general categories: (1) Experimental feeding tests to determine the utility and value of various dry foods of animal and vegetable origin used as supplements to the regular meat diets and the reactions of various species of trout to these foods; (2) studies to determine the efficiency of conversion of commercial feed combinations in trout; and (3) studies concerned with the vitamin and mineral requirements of trout. No attempt will be made to present in detail the findings of these investigations for the information is being assembled for publication elsewhere, but only the general character of the work and the more striking results attained will be indicated.

During the previous season experiments were started to determine the relative growth of trout species on diets of meat and dried milk products. These experiments were run to compare the relative merits of dry buttermilk and dry skim milk when fed with equal parts of cottonseed meal and fresh meat, to compare the relative merits of spleen, heart, and liver as supplements for a mixture of dry buttermilk and cottonseed meal, and to compare the growth rates of rainbow, brook, and brown trout fed the same diet and surrounded by the same physical conditions. These experiments were undertaken again using fish of the same size which were placed upon experimental diets within a short time after the first feeding. Some of these experiments ran for 20 weeks and others for 60 weeks. Growth curves representing the mean of 400 individuals during the first 16 weeks and 200 individuals thereafter indicate that spleen and heart during such a period are as satisfactory as liver in supplementing cottonseed meal and dry skim milk. The dry buttermilk and dry skim milk proved of equal value for growth, although the latter is a better binder for dry feeds.

Using a diet of cottonseed meal, dry skim milk, and fresh meat (raw sheep plucks) in equal parts it was found that for 24 weeks brown trout grew more slowly than brook trout. An improved experiment using a more suitable diet for fry, which consisted of a mixture of fresh beef liver, 2 parts, and dry skim milk, 1 part, and using 500 fry for each experiment was continued for 40 weeks. The four species—brook, rainbow, lake, and brown trout—were used. Growth curves based on dry weight for the smaller sizes and live weight for the larger fish indicate virtually parallel growth rates for all species, although the brown trout during the latter weeks showed a somewhat reduced growth.

Beginning with their first feeding 425 fry were fed various diets for 24 weeks and the growth rates determined on both the dry weight and the fresh live weight basis. A diet of fresh beef liver and dry

skim milk, 2:1, was used to determine if two daily feedings of such a diet were satisfactory. Although the growth curve showed good results, it was below the maximum. A diet of fresh beef liver and dry skim milk, 1:2, was fed 6 times daily as a basis of comparison for the growth rate obtained from feeding fresh beef liver and dry whole milk, 1:2. This experiment with whole milk was included to see if butter fat, which is present in the whole milk but very low in the skim milk, might not be advantageous in feeding young trout. This butter fat provides a diet richer in calories as well as the fat soluble vitamin A. In this combination, however, liver seems to provide adequate supplies of this vitamin, since the growth curves in the two experiments were identical.

At the same time another lot of trout was fed dry skim milk and raw egg in the ratio of 1:1 to test eggs as a source of the growth factor H, which is destroyed in the usual drying of fresh meats. No appreciable difference in growth rates was observed. Another diet consisted of dry skim milk, cottonseed meal, and white-fish meal in the ratios 2:1:1, fed regularly with a change to the diet of dry skim milk and fresh beef liver once a week. A slow growth rate from this diet was observed for the first 3 months, but after that the curves ran parallel with those obtained from better diets. The spray process of dry skim milk 92 percent, and vacuum dried beef liver 8 percent, was combined for the diet of another experimental lot. The liver was dried under 80° C. in an atmosphere of nitrogen. It was then stored under carbon dioxide until ready for use, in order to determine whether factor H found in fresh liver could be preserved in this way. For the first 20 weeks these fry grew very rapidly, but at the time they were approaching a mean weight of 2 grams their growth became very slow and they started dying rapidly. These experiments show that fry can pass through the early stages with excellent growth upon a dry diet, but even with the careful treatment it received the liver seemed to have lost much of its factor H.

In experiments started during the previous year growth curves were constructed for trout fed upon mixtures of dry buttermilk, skim milk, cottonseed meal, and peanut meal. Data were then available only for 16 weeks, but these groups of trout were continued for 8 additional weeks or a total of 24 weeks. Five hundred brook trout were used in each group at the beginning. At the end of 16 weeks this number was reduced to 300 in order to prevent crowding in the troughs. As far as these growth curves indicate these practical diets are equal in value. Either peanut meal or cottonseed meal are suitable trout feeds if combined with a binder such as dry skim milk. The percent utilization of such feeds, however, cannot be determined until balance experiments can be run.

During the past year standard fish hatchery troughs were used for running another series of studies upon commercial feedstuffs that had already been tested in previous years. Experimental diets were composed of varying proportions of dried skim milk, cottonseed meal, white-fish meal, salmon-egg meal, and raw beef liver. Each experimental group was started with 1,250 fingerling brook trout of the Pittsford (Vt.) strain and continued for 28 weeks.

The poorest growth was made by a group fed on a diet of beef liver alone. The best growth was obtained from the group fed on a diet composed of equal parts of cottonseed meal, skim milk, and salmon-egg meal, supplemented with 15 percent of fresh liver. White-fish meal can be substituted for the cottonseed meal and will produce similar results, both as regards growth and economy. Since the best growth resulted from the diet containing 15 percent fresh beef liver, this combination seems adequate for a period of at least 6 months.

In analyzing the results of these experiments with commercial feed combinations, the efficiency of conversion has been calculated to show the number of grams of feed required to produce 1 gram gain in weight of trout during the 4-month period, and also the cost of feed required to produce 1 pound of trout. It is furthermore of interest to compare the ability of different trout species to convert feedstuffs to body tissues, especially where there is a constant water temperature.

Analysis of the results shows that the dry feed required to produce 1 unit by weight of trout ranged from an average of 2.69 units, using a diet of skim milk, cottonseed meal, and raw beef liver, 1:1:2, to as high as 5.35 units, on a diet of skim milk, 29 percent; cottonseed meal, 28 percent; raw beef liver, 15 percent; and white-fish meal, 28 percent. The trout are somewhat more efficient than these figures show, however, because the losses of feedstuffs in the water are calculated as feed consumed.

In these studies the mean value for food conversion among the different species of trout are: Lake, 3.06; rainbow, 3.47; brook, 4.73; and brown, 5.14. These results to date indicate that the species that is most efficient food conversion in water with a temperature of about 47° F. is the lake trout, while the least efficient is the brown trout.

Experiments were undertaken to develop a biological method of assaying the potency of various growth factors in prepared food materials. In vitamin assay experiments with rats, it is a common practice to deplete their stores of a given vitamin until they cease to grow. At this point the substance to be assayed for its vitamin potency is fed at various levels to the animals that have been depleted. The growth response serves to measure the potency of the vitamin preparation. Attempts were made to establish such assay methods with trout, but thus far no standard procedure has been developed. We have no knowledge of the relative requirements of fish for vitamins compared to the higher animals.

Two lots of experimental fish, which showed the usual marks of failure upon totally dried diets, were changed to a diet of dry skim milk, supplemented with fresh liver, preserved in 5 percent by weight of calcium hypochlorite. Upon this new diet the growth rate became normal and the mortality rate declined, indicating that trout can ingest meat preserved in hypochlorite without apparent injury.

Another lot fed on a dry diet until the growth rate had fallen and mortality sharply increased was transferred to a diet of dried skim milk, supplemented with one-twentieth of its weight of liver dried in a current of nitrogen. The growth and mortality curves confirm earlier findings that liver will retain some of its potency in factor H if dried at a low temperature in inert gas. Such experi-

ments represent relatively crude assays but they provide the foundation for improved ones.

After the first experiments with trout feeding, a requirement for specific substances similar to vitamins was recognized by Dr. McCay. This vitamin requirement could not be stated in terms of recognized accessory factors since it was very sensitive to heating and was destroyed when food products were dried at the usual high temperatures in contact with air.

In the course of the past 3 years, it has been discovered that this vitamin termed factor H is partially preserved by drying at low temperatures in contact with an inert gas. Since the determination of the requirements of trout for the recognized vitamins is very difficult until more is learned concerning the nature of factor H, efforts have been continued to prepare a concentrated extract containing this growth factor.

Two methods of testing have been employed. One consists in feeding trout on a purified mixture of casein, a starch-dextrin, yeast, cod-liver oil, and salt mixture, plus the supplement to supply factor H. Yeast and cod-liver oil have been used simply because it is very likely that all higher animals require some of the factors contained in yeast as well as some of the fat soluble vitamins.

Up to the present time only alcoholic extracts of beef lungs and liver have been prepared. Careful methods have been employed in order to preserve the accessory growth factor. Dried beef liver, evaporated in vacuo under inert gas, was prepared as a control.

From a number of assays it was found that 15 percent of raw liver was an adequate supplement for an otherwise complete diet, furnishing a sufficient supply of factor H. Hence, the present experiments were started with a 5 percent supplement on concentrated products, but growth and mortality curves show that this level was too low. At the end of about 2 months the supplement was increased to 15 percent. Nevertheless, growth curves indicate that much of the original growth factor was lost even in the vacuum dried liver. It also indicated that a considerable fraction of factor H is held in the alcoholic extract. The lung residue is almost totally lacking in this factor, while the liver residue still retains some potency.

A second series of assays were undertaken, testing the efficiency of autolyzed liver products as supplements for a synthetic diet deficient in factor H, in the hopes of finding a liquid liver with a high degree of potency. These data indicate that raw egg and liver extract, plus residue, have considerable amounts of factor H, but they do not clearly establish that autolysis destroys factor H because the material used as a preservative in the course of autolysis may have influenced the results.

#### LIMNOLOGICAL INVESTIGATIONS IN THE ROCKY MOUNTAIN REGION IN THE INTEREST OF FISH STOCKING

Because of the severe curtailment of the Bureau's appropriations, investigations in the national parks and forests under the direction of Dr. A. S. Hazzard were omitted during 1933, and a program of field work which entailed minor expenditures was substituted. However, lessened field activities afforded opportunity for study of data

previously obtained and made possible the preparation of several papers for publication.

#### QUANTITATIVE FOOD STUDIES IN MOUNTAIN STREAMS

Numerous samples of bottom organisms were taken from square-foot units of bottom in four mountain trout streams in the vicinity of Salt Lake City, using methods developed by Dr. Needham, of the Bureau's staff. The purpose of these studies was threefold: to determine the variation in food supply at different elevations in the same stream and in different streams; to study the fluctuation in numbers and weight of bottom organisms in three streams during the months of July, August, and September; and to secure some information as to the relative productivity of trout streams in this region as compared with those studied in other parts of the country.

Fifty-three square-foot samples, taken in the riffle areas where the bottom consisted of gravel and small rubble, showed great variation both as to numbers and total weight of organisms in different streams. Since other environmental conditions were similar, higher temperature was considered responsible in certain waters for the production of greater variety and quantity of food. Caddis flies and may flies were found to be dominant organisms in these mountain streams.

Samples taken at elevations from 4,400 to 7,500 feet on one stream and from 5,700 to 7,000 feet on another showed no appreciable difference in weight over the average for each stream.

The studies also indicated that the food supply for any stream is not constant for the summer months. In one stream a rise in weight of samples occurred in August, followed by a decline nearly to the July level in September. In another an increase in weight was noted throughout the summer. In the third, a marked decrease in the average weight of samples occurred in each successive month. On the other hand, all three streams showed a marked increase in the number of organisms in August, followed by a decrease in September, which, however, did not reach the July level. This indicates that August is probably the best month for planting small trout in our mountain streams as the smaller organisms are most numerous then.

The average wet weight of the 53 samples was found to be 1.18 grams, although the average for the 3 streams studied monthly was 1.69. These averages compare very closely with those for trout streams of New York and California having a similar type of bottom.

The results of this investigation were presented at the fall meeting of the Utah Academy of Sciences and will appear in abstract form in the proceedings of this society for 1933.

#### COOPERATIVE INVESTIGATIONS

Through the cooperation of the Utah Fish and Game Department in defraying field expenses and furnishing assistance, limnological studies were made of three important fishing waters for the purpose of developing better plans for regulation and planting. The Divi-

sion of Fish Culture of the Bureau also made possible a study of Bear Lake, Utah.

*Fish Lake.*—Inasmuch as this is probably the most productive trout lake for its size in the country, the privilege of making a limnological study here was welcomed not only as an opportunity to assist the State in its planting policies there, but also to seek to determine the reason for its phenomenal productivity. Since accurate information as to what constitutes a good trout lake is scarce, additional information is of great value in judging the carrying capacity of other waters and in seeking means to improve them.

The usual procedure for the study of lakes was followed except that more complete data were taken than is usually possible during a preliminary survey. One hundred forty soundings were made as a basis for the construction of a reasonably accurate contour map. Temperatures were taken at frequent intervals from surface to bottom in various parts of the lake. Chemical analyses for dissolved oxygen, free carbon dioxide, carbonates, bicarbonates and pH were made at a number of stations and on the principal tributaries. Transparency was measured by the Secchi disk. Numerous samples of plankton and bottom foods in the benthic and littoral zones were secured. The type of bottom and areas of vegetation were recorded on the large scale map. Three 1-hour gill net sets were made and a number of fish taken by anglers were secured for scale samples, weight-length data, and stomach analysis. The tributary streams were also examined in order to determine their relation to the lake's productivity. A record of the planting and fishing history is being compiled by a member of the State Department. When the study of the data is complete, a joint paper will be prepared covering this investigation. It is believed that valuable information will result from this study.

*Strawberry Reservoir.*—A marked decline in the fishing in this lake resulted in the request for a study to determine the cause and possible remedies. This investigation was begun in May, just before the break-up of the ice. At that time it was impossible to study conditions except at one point. Samples of the bottom water indicated a marked deficiency in oxygen which, if typical of the lake, might account for reported winter losses. Plans are made to obtain sufficient samples in February 1935 to determine the severity and extent of this deficiency.

Sets with the graded size gill net, the approximate efficiency of which has been determined, indicated an extreme scarcity of trout in June of this year. This, together with the small run of spawning fish, led to an order by the State Fish and Game Commission closing the reservoir and its tributaries to fishing in order to conserve the remaining stock of native cutthroat trout.

Samples of the plankton and bottom organisms in June and in August indicated a great abundance of both of these foods but a scarcity of shore forms, the latter being caused by severe fluctuation in water level. Stomach examination of trout and chubs (*Tigoma*) showed them to be direct competitors. The studies of June and August showed an abundance of oxygen to be present everywhere in the bottom waters. Apparently no summer deficiency occurs here, probably because of shallow water, exposed location and frequent

heavy winds. Temperatures were found to be suitable everywhere, probably caused by high altitude and cold nights. Since all other conditions appear to be favorable, the explanation may be found in winter oxygen deficiency.

*Scofield Reservoir.*—Reports of poor catches at this lake, together with rumors of heavy winter losses, resulted in a request by the department for this study. Sets with the graded size gill net indicated a reasonable abundance of trout in a portion of the reservoir and thereby reassured guides and fishermen in that locality. Subsequent improvement in the catches confirmed our findings. Food samples showed a fair amount of plankton and bottom forms. Oxygen determinations during August at 6 scattered stations indicated a marked deficiency over about half of the area in spite of the fact that a maximum depth of only 21 feet was found. This indicates that there may be a decided winter deficiency which would cause a considerable loss of trout. Recommendations that heavy plantings here be avoided and that a study of winter oxygen conditions be made are being followed.

*Bear Lake.*—At the request of the Bureau's Division of Fish Culture, a study of Bear Lake, Utah-Idaho, was made possible by the defrayment of expenses by that division.

Chemical analyses made during a former study by the Bureau, and confirmed in part by this investigation, show an abundance of oxygen at all depths. The water is highly alkaline and, according to previous studies, contains considerable zinc. Temperatures were found to be entirely suitable for trout. A study of the food supply, however, indicated a decided deficiency. Plankton was found to be scarce. The Bureau's earlier workers also remarked the scarcity of phytoplankton and suggested that the high zinc content might be a cause. Bottom samples were poor in both the deeps and the shallows, the sand beaches being almost devoid of life. Limited areas of gravel and rocky shore supported a goodly number of organisms, including shrimp. Aquatic vegetation appeared to be limited to a few small patches of Potamogeton. Permanent lowering of the lake level by power development has resulted in a littoral zone composed almost entirely of sand, leaving stranded the original gravel and cobble beaches. This has undoubtedly eliminated a rich productive area and thereby decreased the lake's food supply. Sets with the graded size gill net indicated a scarcity of fish.

Observations following several plantings of fingerling trout and salmon indicated that heavy losses may be sustained due to the depredations of gulls, chub (Tigoma), and adult trout. A period of approximately 48 hours seems necessary for young trout and salmon to lose their conspicuous dark color and to acquire the strength and agility necessary to escape their enemies. Experiments in adaptation will be conducted by the Division of Fish Culture at this lake during the coming season in an attempt to overcome this loss in planting.

#### MUSSEL INVESTIGATIONS AND POLLUTION STUDIES IN INTERIOR WATERS

The various activities carried on by the staff under the direction of Dr. M. M. Ellis with headquarters and laboratories furnished by the

University of Missouri have been grouped under the two headings, mussel investigations and pollution studies. Attempts at artificial propagation of mussels have led to a study of the effects upon aquatic life of stream pollution by industrial wastes although these effects are by no means confined to mussels but extend to the food and game fishes as well.

#### FRESH-WATER MUSSEL INVESTIGATIONS

*Mussel propagation experiments.*—The raising of large numbers of fresh-water mussels in limited areas and with a limited water supply, which is being done successfully in the Fort Worth raceway experiments, presents a series of problems concerning which little or no data exist. Hence, a program of investigations was undertaken over a year ago looking ultimately to the solution of the practical problems of mussel farming. During the past year much progress has been made in this work. To date the findings may be summarized as follows:

*Physical and chemical environment data.*—A very complete set of data on the chemical and physical features of the environment suitable for the growth of fresh-water mussels has been obtained, including continuous daily records of temperature, dissolved gases, relative acidity, lime content, and other factors, for a period of over 14 months. These data have demonstrated that the calcium content of the water can be controlled and a calcium level suitable for proper shell growth readily maintained by the simple expedient of splashing the intake water through piles of limestone rubble, as was done in these experiments. From these records and analyses a set of normals has been established against which conditions in other experiments or even in other localities can be checked.

*Bottom survival.*—Commercially it is desirable that as large if not larger mussel populations be maintained on a given area of bottom in artificial raceways as would be found in natural waters. However, in the raceway the volume of water available is much less than in a natural river or stream. To determine, therefore, the balance between numbers of mussels per unit of bottom and amount of water flow, experiments on this phase of the raceway problems were undertaken. These experiments have yielded very definite results and have made progress to the next development possible.

The maintenance of proper bottom conditions for mussels in artificial raceways requires the constant flow of a large volume of water, so directed that the current will scour the bottom free of silt deposits.

Deposition of even so small a layer of silt as one-quarter of an inch in thickness, over the bottom of the raceway soon killed out even the adults of most species of fresh-water mussels. The harmful effects of erosion silt were greatly increased by particles of decomposing algae and other organic matter which in the undisturbed silt deposits, created a high oxygen demand. These findings on erosion silt and organic wastes confirm our previous statements, based on field work in natural waters, concerning the elimination of mussel beds in natural streams by silt deposits.

The volume of water required for the power scouring of raceway bottoms would be too large and too expensive to be practical under most conditions of mussel farming, if large numbers of mussels are to be handled in small areas and all of the available space utilized.



In the bottom survival experiments the yellow sandshell was found to be the least resistant to silting in, and the river mucket from Indiana, the most resistant, of the better commercial species. The best survival (considering the heavy-shelled species) against the unfavorable conditions brought about by silt deposit was made by the maple-leaf shell.

*Mussel crate experiments.*—From the results of the bottom survival experiments it was evident that in view of the average volume of water available for such raceways, it was not feasible to raise mussels in large enough numbers on the bottom to make the project commercially practical, especially with the silt hazard always an uncertain variable. With a view to eliminating the bottom silt hazard and also to increasing the actual number of mussels held in any raceway to a commercially desirable figure, crates in which mussels are now being raised, were devised for the raceways. In these crates the mussels are relatively free from any sort of mud or silt hazard and as the trays of the crates are in tiers, from 3 to 10 times as many mussels are now being carried in a single crate as could be raised in the same bottom space as that supporting the crate. This advantage is gained too without any increase in the amount of water used. During 4 months of trial, the crates, of which we now have 3 types, are proving very successful, and the survival of the mussels in the crates has been excellent even though the animals are being crowded intentionally to determine the maximum number a given volume of water will support, both with and without artificial feeding. The effects of light penetration through the water on the animals in the top trays, the spread of mites, and the growth of algae on the trays are being followed simultaneously with the main experiment, and at present over 10,000 mussels are being carried in one series of crates alone in species survival, breeding stock, and age-class tests.

*Physiological and biochemical studies of mussels.*—In order to determine the success of various tests in the Fort Worth raceway project, as well as the condition of the mussels themselves, several lines of physiological and biochemical studies on mussels have been followed of necessity at the Columbia laboratories.

*Food and food storage.*—The feeding experiments have been continued at Columbia. The ability of mussels to utilize various types of cheap material as food was determined by biochemical analyses of the stored food. The relation of this stored food to survival and to the body condition of the mussel has just been checked in a series of experiments running over some 18 months. It was found that the yellow sandshell could survive complete starvation for 10 to 18 months before the reserve food supply was seriously depleted, if the animal were well fed to start with. The mussel seems to be an irregular feeder, storing large quantities of reserve food when food is abundant and easily available.

*Reproduction.*—So little is known concerning the breeding habits of most of the species of fresh-water mussels that various difficulties have been encountered in obtaining breeding stock for propagation and in selecting lines from which to raise mussels. Both at Columbia and Fort Worth test series are being held for reproduction studies, and attention is given to this phase of the work in the field.

The spawning habits of the Arkansas fanshell have been definitely determined and confirmed by observations in **three different years** by Thomas K. Chamberlain. In the field studies the formation of winter colonies has been discovered and **significant observations on the method of fertilization obtained**. Over 400 marked individual mussels have been collected from such colonies for study.

*Internal and external activities as indices of condition.*—The studies at Columbia of the mussel heart by H. L. Motley have provided normals with which the condition of mussels in the various experiments is readily compared. This heart test has also proved very helpful in field examinations as well as in the laboratory studies, and new information concerning the successful shipment of mussels has been one of the advances made through the application of these heart data. By slowing the heart action with cold, dry air (5°–10° C.) it was found that the metabolism of the animals could be reduced to almost the hibernation level. Applying this fact, living mussels have been kept out of water in dry air for over 80 days, and have remained in good condition throughout the tests, thus indicating a new safe method for the shipment of mussels over long distances and with no care on the part of the carrier. The survival in shipment tests has been practically 100 percent.

The observations on mussel activities under normal and adverse conditions have been greatly extended and are now being revised for publication.

#### POLLUTION STUDIES

*Erosion silt.*—The review of the mass data on erosion silt and its bearing on fisheries problems has been completed and the scientific results organized for publication. Particular attention has been given to the effects of erosion silt on light transmission, conductivity, water temperature, and salt content, as bearing on fisheries problems.

*Arsenic investigations near Gardiner, Mont.*—The study of arsenic pollution in Bear Creek, a tributary of the Yellowstone River near Gardiner, Mont., was made with reference to stream pollution and to possible storage of arsenic by certain aquatic insects which are eaten by the trout and whitefish. These investigations were particularly important to the program of pollution in that they pointed to an unlooked for source of storage which must be considered in future studies of other heavy metals as well as arsenic.

*Cooperative projects with United States engineers.*—The cooperative work with the United States engineers has been continued during the year. Plans are now being made for a continuation of these projects as requested by the office of the Chief of Engineers. This work consists in the investigation of stream conditions with reference to erosion and pollution and supplies much information on our inland waters.

*New method for studying pollution effects.*—As a result of difficulties encountered in previous studies of pollution problems and in view of the various discrepancies between existing observations on pollution and relative toxicity of pollution agents, experiments have been in progress for some time looking to the development of more satisfactory methods of study and to the standardization of results. New apparatus has been devised and new technique perfected which

will be used in further pollution studies. These new methods involve the use of standard strains of plankton animals raised under controlled environments and tested under uniform conditions of temperature, light, etc., which can be repeated time after time with extreme accuracy. Both immediate and cumulative effects can be studied by this method. The findings in the plankton tests are verified on standardized fish preparations and on standardized free living fish, both in the laboratory and under controlled conditions out of doors. The new plan offers scientific data on pollution and pollution problems which were not obtainable by the other methods of study. Already the method has been applied to the investigation of heavy metal pollution, industrial wastes, and municipal wastes with excellent results in each case. A general standardization of pollution measurements is to be produced as rapidly as the work will permit.

In connection with the development of standard procedure for the maintenance of standard strains of plankton, the work required the reinvestigation of basic food for plankton, and it was found that this could be derived from several elements of waste now lost in general sewage disposal. Investigations of these various food constituents are now under way and one new combination for plankton food is in press from this work.

#### INDEPENDENT ACTIVITIES OF THE FISHERIES BIOLOGICAL LABORATORIES

The Bureau owns and operates four Fisheries biological laboratories located respectively at Woods Hole, Mass.; Beaufort, N.C.; Fairport, Iowa; and Seattle, Wash.

The Woods Hole laboratory, provided with running salt water, a reference library, and the usual biological, chemical, and photographic laboratories and stock rooms, normally offers alcoves or tables for the free use of independent investigators engaged in research in marine biology. A marine fish hatchery is operated in conjunction during the winter, and a small public aquarium is maintained during the summer season. A 40-foot diesel-powered vessel, equipped for trawling, tow net, and hydrographic work, and smaller launches and rowboats are attached to the station.

The Beaufort (N.C.) laboratory has no public aquarium nor as extensive a library as at the Woods Hole station, but has running salt water and similar laboratory facilities and floating equipment. Owing to the mild climate and the terrapin hatching activities, the station is operated the year around and offers research facilities to private investigators.

Research activities at the Fairport (Iowa) laboratory, equipped for the investigation of fresh-water biology, have been entirely discontinued, owing chiefly to a lack of sufficient funds. The station is operated for the present by the Division of Fish Culture solely for the culture of warm-water pond fishes.

The Bureau's newest laboratory at Seattle, Wash., serves as headquarters for the Division's Pacific coast and Alaska research staff, whose activities are reported elsewhere, for the technologists and statistical agents of the Division of Fishery Industries, and for the staff of the International Fisheries Commission, United States and Canada. Although, except for a chemical laboratory, the building is not

equipped for experimental biological research, complete plumbing was installed in most of the rooms when the building was constructed so that it can be adapted readily for experimentation in the future should fishery investigations in that region develop so as to require such equipment. Hence no facilities are available for guest investigators.

#### WOODS HOLE LABORATORY

During the summer of 1933 experiments on the physiology of the oyster were continued by Dr. P. S. Galtsoff and R. O. Smith and experiments on methods of marking mackerel were carried on by O. E. Sette at the Woods Hole Biological Station. Continued lack of necessary operating funds prevented other work at this station.

This is the second summer that this well-equipped marine laboratory, capable of providing facilities for some 20 investigators, has been largely unused. In the meantime, problems of importance to the development of fisheries biology, whose solution would greatly facilitate progress in the major investigations on the condition of our fisheries, are rapidly accumulating. Among these are: (1) The effect of temperature and food on the rate of growth of certain food fishes; (2) the effect of group behavior on activity and rate of growth; (3) the physiological effects on the fish of injuries received in tagging operations; (4) the effect of temperature on calcium metabolism and consequent alteration of scale structure; (5) the factors responsible for high mortality in the larval stages of fishes; (6) the effects of temperature on the respiratory mechanism of mackerel. These and many other problems might readily be attacked at very little expense to the Government by volunteer investigators from universities if they could be provided the facilities. Hence resumption of normal activities at the Woods Hole laboratory is urgent.

#### BEAUFORT LABORATORY

*Research.*—Operation of the Beaufort laboratory was continued throughout the year under the direction of Dr. H. F. Prytherch and furnished facilities for the study of fishery problems of the South Atlantic and Gulf region. The chief investigations conducted here at present by the Bureau's staff are reported elsewhere. Laboratory facilities for marine research have been furnished to 13 independent research workers from other institutions who have engaged for short periods of time in the following studies: Dr. H. V. Wilson, University of North Carolina, behavior of living cells of Polyzoa; Irene Bolick, University of North Carolina, lymph cells of Echinoderms; W. H. Hadley, Jr., Cornell University, the foraminifera of the North Carolina coast; H. C. Burdick, State University of Iowa, metabolism of fish; Dr. Bert Cunningham, Duke University, relation of temperature to rate of development of terrapin embryos; Dr. P. B. Powers, University of Pennsylvania, ciliate Protozoa of Echinoderms; F. R. Brown, Vanderbilt Medical School, spermatozoa of Prosobranch snails; L. Lyndon Williams, Rensselaer Polytechnic Institute, distribution of marine invertebrates in the vicinity of Beaufort; Dr. Hoyt S. Hopkins, New York University, respiration and tissue-glycolysis in bivalve mollusks; Earl Mathis, Northwestern

University, susceptibility of fish to tubercular bacilli; Dr. Duncan S. Johnson, Johns Hopkins University, the ecology of vegetation of Bogue and Shackleford Banks; Donald B. Lawrence, Johns Hopkins University, effect of sand dunes movements on flora of Shackleford Banks; Edward D. DeLancaster, Johns Hopkins University, blue-green algae of the Beaufort region.

The facilities of the station were also utilized by the United States Chemical Warfare Service for tests of wood preservatives and by the Bureau's Division of Fishery Industries for experiments on the durability of net twines treated with different preservatives. Cooperative tests were made with the Woolsey Paint Co. in respect to the anti-fouling and protective value of copper paints; with the Tropical Paint & Oil Co. on the suitability of Bakelite varnish for marine use; and with the Union Carbide & Carbon Corporation to determine the value of different grades of stainless steel and other steel alloys for the prevention of fouling of ship bottoms.

*Terrapin culture.*—The propagation of diamond-back terrapin was continued at the Beaufort laboratory in cooperation with the Division of Fish Culture and yielded in 1933 a total production of 10,060 young terrapins, which is next to the highest record obtained thus far in the culture of this species. For the first time the distribution of young terrapins has been extended so as to include the waters of Florida, South Carolina, and North Carolina.

In cooperation with the Florida Department of Conservation 2,000 terrapins were planted on May 12, in selected marshes and protected areas in the Choctawhatchee Bay region. In South Carolina a similar planting was made on April 27, in the vicinity of Charleston in cooperation with the State Board of Fisheries. A somewhat greater distribution of young terrapins amounting to 5,730 was made in North Carolina in cooperation with the Department of Conservation, because of the scarcity of terrapins in these waters and in appreciation of the continued support received from this State in propagation of this species. The remaining 330 terrapins have been saved for breeding purposes and for the continuation of the experimental studies conducted by Dr. George T. Hargitt and Dr. Bert Cunningham, of Duke University.

Over 93½ percent of the original hatch of 10,574 were successfully reared to the age of 9 months at the Beaufort laboratory before liberation. It is believed that these operations establish the highest survival record yet obtained in the culture of fresh water and marine animals where the young of a species are reared over a period of several months. The output of the Beaufort station hatchery since 1930 has been as follows: 1930, 5,778; 1931, 5,500; 1932, 11,086; and 1933, 10,060. During the summer of 1933 a new brood of 10,624 young terrapins was obtained. These terrapins are now being fed for a short period in the fall and are then placed out of doors in protected hibernating pens in order to reduce the cost and labor of their care and feeding as required previously when they were kept during the winter in the heated rearing house. Distribution of the 1933 brood will be made during the following spring throughout the South Atlantic States in cooperation with the various State departments.

## APPROPRIATIONS

The work of the Division of Scientific Inquiry during 1933 was supported chiefly by the appropriation "Inquiry respecting food fishes", of which approximately one-half was available from the last half of the fiscal year ending June 30, 1933, and half from the appropriation ending June 30, 1934. The amount appropriated under this heading for the fiscal year 1933 amounted to \$200,000, but owing to administrative deductions under the Economy Act and by official order the amount available for expenditure was only \$178,001. During the fiscal year 1934, \$173,000 was appropriated under the same heading, but of this amount only \$122,033 was available for expenditure. The appropriation for 1934 is therefore a reduction of 31.4 percent from the funds available for 1933, which in turn was a reduction of 31 percent from the amount appropriated in the previous year. A summary of the amounts available for the various major projects follows.

Projects	1933	1934
Commercial fishery investigations.....	\$92, 711	\$65, 855
Oyster cultural investigations.....	32, 552	22, 932
Aquicultural investigations.....	39, 538	30, 506
Conserving fish by screens and ladders.....	5, 491	250
Washington Laboratory and administration.....	7, 719	2, 500
<b>Total.....</b>	<b>178, 001</b>	<b>122, 033</b>
Allotment for maintenance and operation of vessels.....	14, 000	10, 000

This reduction in appropriation has resulted not only in the serious curtailment of field work in connection with all of the projects and legislative reductions in salary, as well as the assignment of administrative furlough to all the investigators, but has required the dismissal of a number of the Division's regular staff. The most serious aspect of this reduction in personnel lies in the diversion of skill, experience, and technical training from fishery research into other fields rather than in the increase of unemployment thereby. This is a loss which will have a lasting effect upon the development of fishery science and aquiculture for men with adequate fundamental training and sufficient practical experience to conduct productive studies in these fields are extremely limited in number. Since few universities offer adequate training in these lines, the rebuilding of a scientific staff in the future will be correspondingly retarded.

Two of the Bureau's biological laboratories have been closed, and, as noted elsewhere, the vessel facilities have been severely curtailed by the loss of the *Albatross II*, which was laid up during the fiscal year 1932 and decommissioned on July 1 of that year, thus leaving the Bureau with no means whatever of conducting certain essential types of investigations on the fishing grounds where the most important marine fisheries of the United States are prosecuted.

With the complete expenditure of funds allotted by the Public Works Administration during the coming fiscal year, certain projects

of great value to the fishery resources of the country that have gotten well under way will have to be abandoned for lack of regular appropriations for their continuation. One of these projects is the investigation of stream pollution and means of neutralizing or properly utilizing waste materials now rendering large portions of our streams unfit for aquatic life.

With the construction of dams on the Columbia River, the salmon runs of that watershed will be seriously menaced. Continued observations on the effectiveness of fish protective works at the Bonneville Dam will be required after the expenditure of the Public Works allotment, and these studies must be coordinated with similar studies at other dams now built or under construction. This work should be carried on for at least a 10-year period by regular annual appropriations.

With Public Works funds, a favorable beginning will have been made in planning a rational stocking policy for the waters of the public domain included in the national forests. Less than one-sixth of the total forest area can be covered, however, with the allotment during the coming year and, forming as it does the very foundation of fishery conservation in interior waters, should be continued on the present scale until the entire area of the national forests has been covered. This work likewise should be supported by annual appropriations commensurate with the importance of the undertaking.







# PROPAGATION AND DISTRIBUTION OF FOOD FISHES, FISCAL YEAR 1934<sup>1</sup>

By GLEN C. LEACH, *Chief*, and M. C. JAMES, *Assistant Chief, Division of Fish Culture*

## CONTENTS

	Page
Introduction.....	385
Species propagated.....	386
Production.....	387
Construction activities.....	388
Cooperation with other conservation agencies.....	389
Salvage operations.....	392
Assignments of fish eggs to States, Territories, and foreign countries.....	393
Transfer of eggs between stations.....	394
Output of fish.....	395
Egg collections.....	402
Notes on operations.....	403
Commercial species.....	403
Great Lakes species.....	404
Marine stations.....	405
Anadromous species of the Atlantic coast.....	405
Game fish propagation.....	406
Rocky Mountain territory.....	406
New England stations.....	408
Combination trout and pond-fish stations.....	409
Pond-fish stations.....	411
Mississippi River territory.....	412
Aquarium.....	413
Fish-cultural notes.....	413
Hatching salmon eggs on stacked trays.....	413
Discontinuance of fish-cultural notes.....	414
Distribution operations.....	414

## INTRODUCTION

The fiscal year 1934 has seen some important changes in the activities of the Federal fish-cultural establishment. The period has been marked by a definite curtailment in the scope of propagation activities, contrasted with the development of physical equipment to a high state of efficiency. The latter objective was accomplished by the utilization of unemployment relief, funds, and labor for the repair and reconditioning of older stations, and a continuation of the development of newer hatcheries. The Federal hatcheries are now in condition to produce the largest output of fish in their history whenever increased funds for actual operations may be available.

In line with the Administration's policy in devoting greater attention to the conservation of interior resources by such means as reforestation, conservation of water, and protection of migratory water fowl, the Bureau has concentrated upon the propagation of game fishes. These forms are subject to a more immediate possibility of

<sup>1</sup> Appendix IV to the Report, Commissioner of Fisheries, 1934. Approved for publication, Jan. 18, 1935.

depletion or extermination, and are of a direct interest to a larger number of people than are the commercial varieties. The latter are, as a whole, more capable of maintaining their numbers by natural replenishment. A need more clearly evident and benefits to a maximum number of people were the justification for this modification of previous policy.

A bald statistical and tabular summary of the year's activities falls far short of presenting a true picture of the real nature of this work. It is unlike the routine governmental function in that it calls for cooperation with and assistance to nature. Much of the work is actually conducted in the isolated wilderness and it requires resourcefulness, ingenuity, and hardiness on the part of the personnel. The following data will reveal what was accomplished by the Division of Fish Culture in 1934, but the ultimate outcome and value of the work will rest in the success or failure of anglers and commercial fishermen several years hence.

### SPECIES PROPAGATED

Four species which appeared in last year's records were not propagated during 1934. Three of these, glut herring, cisco or lake herring, and pollock, are commercial forms. No Dolly Varden trout, a western trout for which there is little demand, were handled. The 42 principal varieties which were distributed include the most important game fishes and a number of the commercial species which are most amenable to artificial propagation. While minnows, shiners, and bait fish are propagated as forage forms at the hatcheries, they are not available for distribution. The following summary shows the common and scientific designation of the species produced.

#### CATFISHES (SILURIDAE):

Catfish (*Leptops olivaris*).

Spotted catfish (*Ictalurus punctatus*).

Horned pout (*Ameiurus nebulosus*).

#### CARP (CYPRINIDAE): Common carp (*Cyprinus carpio*).

#### BUFFALOFISH (CATOSTOMIDAE): Common buffalo (*Ictiobus* sp.)

#### SHAD AND HERRING (CLUPEIDAE):

Shad (*Alosa sapidissima*).

#### SALMONS, TROUTS, AND WHITEFISHES (SALMONIDAE):

Common whitefish (*Coregonus clupeaformis*).

Chinook, king, or quinnat salmon (*Oncorhynchus tshawytscha*).

Chum salmon (*Oncorhynchus keta*).

Pink or humpback salmon (*Oncorhynchus gorbuscha*).

Coho salmon, silver salmon (*Oncorhynchus kisutch*).

Red salmon, sockeye, or blueback salmon (*Oncorhynchus nerka*).

Steelhead salmon (*Salmo gairdneri*).

Atlantic salmon (*Salmo salar*).

Landlocked salmon (*Salmo sebago*).

Rainbow trout (*Salmo shasta*).

Black-spotted trout, redbthroat trout (*Salmo lewisi*).

Loch Leven trout (*Salmo levenensis*).

Lake trout, Mackinaw trout (*Cristivomer namaycush*).

Brook trout (*Salvelinus fontinalis*).

#### GRAYLINGS (THYMALLIDAE): Montana grayling (*Thymallus montanus*).

#### PIKES (ESOCIDAE): Pike and pickerel (*Esox* sp.)

#### SUNFISHES (CENTRARCHIDAE):

Crappie (*Pomoxis annularis* and *P. sparoides*).

Largemouth black bass (*Micropterus salmoides*).

Smallmouth black bass (*Micropterus dolomieu*).

Rock bass (*Ambloplites rupestris*).

Warmouth bass, goggle-eye (*Chaenobryttus gulosus*).

Bluegill sunfish (*Lepomis incisor*).

## SUNFISHES (CENTRARCHIDAE)—Continued.

- Green sunfish (*Lepomis cyanellus*).  
 Redbreasted bream (*Lepomis auritus*).  
 Red-eared sunfish (*Lepomis heros*).  
 Common sunfish (*Lepomis gibbosus*).  
 Rio Grande perch (*Herichthys cyanoguttatus*).

## PERCHES (PERCIDAE):

- Pike perch (*Stizostedion vitreum*).  
 Yellow perch, ringed perch (*Perca flavescens*).

## WHITE BASSES (SERRANIDAE):

- White bass (*Roccus chrysops*).  
 White perch (*Morone americana*).

 DRUMS (SCIAENIDAE): Fresh-water drum, lake sheepshead (*Aplodinotus grunniens*).

## CODS (GADIDAE):

- Cod (*Gadus callarias*).  
 Haddock (*Melanogrammus aeglefinus*).

## FLOUNDERS (PLEURONECTIDAE): Winter flounder, American flatfish.

 MACKERAL (SCOMBRIDAE): Common mackerel (*Scomber scombrus*).

Summary, by species, of the output of fish and fish eggs during fiscal year ending June 30, 1934

Species	Eggs	Fry	Fingerlings	Total
Catfish.....		5,000	5,149,400	5,154,400
Buffalofish.....	7,725,000	5,000	85,000	7,815,000
Carp.....	6,250,000	290,000	1,330,000	7,870,000
Shad.....		11,574,000		11,574,000
Whitefish.....	60,000	9,290,000		9,350,000
Chinook salmon.....	6,025,000	759,000	19,124,600	25,908,600
Chum salmon.....		11,621,000	236,500	11,857,500
Silver salmon.....		1,430,000	1,103,000	2,533,000
Sockeye salmon.....		5,450,000	18,144,100	23,594,100
Humpback salmon.....		139,000		139,000
Steelhead salmon.....	110,000	73,000	2,198,500	2,381,500
Atlantic salmon.....			20,900	20,900
Landlocked salmon.....			474,100	474,100
Rainbow trout.....	6,695,000		12,538,600	19,233,600
Blackspotted trout.....	18,165,000		16,294,700	34,459,700
Loch Leven trout.....	13,174,000	7,726,000	5,526,400	26,426,400
Lake trout.....	500,000	786,000	383,400	1,669,400
Brook trout.....	5,654,000	3,597,000	20,440,700	29,691,700
Grayling.....	290,000	4,950,000		5,240,000
Pike and pickerel.....			72,900	72,900
Mackerel.....		2,946,000		2,946,000
Crappie.....			9,528,300	9,528,300
Largemouth black bass.....		510,000	4,304,200	4,814,200
Smallmouth black bass.....		931,000	334,800	1,265,800
Rock bass.....			84,900	84,900
Warmouth bass.....			14,500	14,500
Sunfish.....			3,951,000	3,951,000
Pike perch.....	830,025,000	6,600,000		836,625,000
Yellow perch.....		4,000,000	2,191,800	6,191,800
White perch.....		900,000		900,000
White bass.....			18,900	18,900
Rio Grande perch.....			8,800	8,800
Fresh-water drum.....			6,600	6,600
Cod.....	1,037,262,000			1,037,262,000
Haddock.....	191,754,000			191,754,000
Winter flounder.....	46,077,000	888,415,000		934,492,000
Miscellaneous fishes.....			2,801,600	2,801,600
Total.....	2,169,766,000	961,997,000	126,368,200	3,258,131,200

All carp and buffalofish shown in above table are planted in commercial areas of the Mississippi River.

## PRODUCTION

A reduction approaching 40 percent in the amount of funds available for hatchery operations was reflected by a great drop in the output of fish and eggs. The production of 3,258,131,200 was less than half of the previous year's record which showed 7,202,155,625. The necessity for economy was met by the outright cessation of operations

at 9 hatcheries, and a definite curtailment of propagation and distribution activities at the majority of the remaining establishments. The bulk of the reduction in output applied to commercial species. There was an actual increase, however, in the output of 10 of the most important species of game fish. The production of these forms amounting to 135,211,900, represents 4.1 percent of the total or twice the ratio of the 1933 figures. The actual number of all species of game fish distributed was slightly below the previous year's owing to a recession in some of the minor forms such as sunfish, crappie, and pickerel. The fact remains that the forms for which the greatest demand exists were available in larger numbers.

There was a reduction in the number of fingerlings and larger fish reared at the hatcheries. The drop of approximately 42,000,000 is largely traceable to the curtailment of operations with Pacific salmon, large numbers of which are reared to fingerlings, and to restrictions on the rescue work in the Mississippi area. The latter activity produces larger fish entirely and the total output of this class fluctuates according to the scope of the work. As far as the important trout and bass were concerned, however, the fingerling production surpassed that for 1933. Discussion of the 1934 production of fish and eggs can be summarized by the statement that the results will fluctuate according to the facilities and funds devoted to the enterprise, and within certain limits can be expanded or reduced at will. Unit costs are sufficiently constant to justify this view of the matter.

#### CONSTRUCTION ACTIVITIES

Construction and repair of the Bureau's hatcheries is a type of work which lends itself well to the Government's program of work-relief and public works construction. The average hatchery requires only limited structural improvements which carry heavy costs for material, while the development and enlargement of ponds and water supplies calls for a maximum of labor.

The Bureau therefore benefited greatly by cash allotments made by the Public Works Administration, by assignment of labor and funds under the Civil Works Administration, and by relief labor assigned by local authorities. Early in the year there was received from the Public Works Administration the sum of \$281,500, providing \$150,000 for the continuation of construction at 5 new hatcheries located in Alabama, Indiana, Pennsylvania, Texas, and West Virginia, with the balance, \$131,500 available for repairs and reconditioning at 29 of the older hatcheries. The allotments were virtually all expended at the close of the year with the exception of a balance remaining for the Leetown (W. Va.) project. All of the new hatcheries were placed on a producing basis or greatly enlarged as to capacity. In the case of the Marion (Ala.) station, the pond area was increased approximately 300 percent and a number of buildings were constructed. These hatcheries were not fully completed up to the limits of their potentialities, however.

During the year two small additional allotments totaling \$12,000, were made for further repairs and reconditioning work. Individual allotments to the various stations ranged from \$1,000 to \$8,500 and were expended for such activities as renewing docks, repairing and repainting buildings, repairing pipe lines and water-supply systems,

enlarging and improving ponds, repairs to roads, and many other upkeep jobs required at establishments some of which have been in operation over 40 years.

At the inception of the C. W. A. program in late November, there was prepared a program providing for the employment of 2,440 men throughout the country and requiring \$25,175 for materials and supplies. This was approved and the work was pushed vigorously in spite of adverse weather conditions in some sections. Forty different stations were selected as locations for this activity, providing for improvements at hatcheries which were not covered under the P. W. A. program and also supplementing the direct allotments at other points. For various reasons the maximum number of men employed at one time was 2,269, but activities were continued up to the close of the program at the end of April. The Marion (Ala.) hatchery was left in an unfinished state, however, and a cash allotment of \$34,116 was received for the purpose of continuing the work after the formal expiration of the C. W. A. activities.

The net results, as far as the Bureau was concerned, were a significant increase in the capacity for hatchery production, the placing of plant and equipment in the highest state of repair and efficiency, and a reduction of charges for maintenance and repair which will release a greater proportion of the appropriation for strictly fish-cultural activities. The following list shows the location of P. W. A. projects and the amounts allotted to each:

*Bureau of Fisheries, Public Works projects*

Project designation	Location	Amount of allotment	Project designation	Location	Amount of allotment
F. P. 2	Boothbay Harbor, Maine.....	\$3,000	F. P. 19	Ennis, Mont.....	\$8,000
F. P. 3	Woods Hole, Mass.....	3,500	F. P. 20	Bozeman, Mont.....	4,000
F. P. 4	Hartsville, Mass.....	1,000	F. P. 21	Buhl, Idaho.....	5,000
F. P. 5	Lake Mills, Wis.....	5,000	F. P. 22	Pittsford, Vt.....	4,000
F. P. 6	Louisville, Ky.....	4,000	F. P. 23	Saratoga, Wyo.....	7,000
F. P. 7	Cape Vincent, N. Y.....	7,500	F. P. 24	Puget Sound, Wash.....	5,000
F. P. 8	National Forest, N. H.....	5,000	F. P. 25	Springville, Utah.....	2,000
F. P. 9	Northville, Mich.....	3,000	F. P. 26	Edenton, N. C.....	3,000
F. P. 10	Erwin, Tenn.....	2,500	F. P. 27	Leetown, W. Va.....	5,000
F. P. 11	Flintville, Tenn.....	5,000	F. P. 31	Marion, Ala.....	18,000
F. P. 12	Tishomingo, Okla.....	5,000	F. P. 32	Rochester, Ind.....	30,000
F. P. 13	Natchitoches, La.....	5,000	F. P. 33	Lamar, Pa.....	20,000
F. P. 14	Orangeburg, S. C.....	3,000	F. P. 34	San Angelo, Tex.....	29,000
F. P. 15	San Marcos, Tex.....	3,500	F. P. 35	Leetown, W. Va.....	53,000
F. P. 16	Lake Park, Ga.....	8,500	F. P. 36	Fort Humphreys, Va.....	3,500
F. P. 17	Warm Springs, Ga.....	3,500	F. P. 37	Wytheville, Va.....	6,000
F. P. 18	Dexter, N. Mex.....	5,000	F. P. 44	Fort Humphreys, Va.....	6,000

### COOPERATION WITH OTHER CONSERVATION AGENCIES

The National Planning Council, formed at the instance of the Bureau of Fisheries for the purpose of coordinating activities of the Federal Bureau of Fisheries and the State fish and game departments, will find its most effective function in the propagation and distribution of fish. New fields for cooperation in the hatchery work have already been developed and older relations strengthened and expanded. From time to time there have arisen proposals to relinquish much of the Federal fish-cultural work to the States by transferring the hatcheries to their jurisdiction. The general reaction of the State authorities

themselves to this move has been unfavorable, apparently in recognition of the fact that there need be no duplication or overlapping, if the work is properly coordinated. The following statements illustrate the extent to which, and the methods by which, efficiency and economy are being achieved by such coordination.

Practical procedure of cooperation in the rearing or planting of fish has already been placed in effect with 27 States. A number of States (Connecticut, Michigan, Montana, New York, and Idaho) review Federal applications before delivery in order that the plants may not conflict with State stocking policies. In a number of other States (Virginia, Georgia, Mississippi, North Carolina, Pennsylvania, Indiana, and Ohio) the actual handling of the fish is on a joint basis, fish from Federal hatcheries being used to fill State applications or vice versa. By this means the Bureau is relieved of distributing costs and fish are planted according to actual needs.

With regard to actual propagation work, in several instances the Bureau has pooled its facilities with other agencies for mutual benefit. This is true in the case of shad propagation in South Carolina, the whitefish and pike perch hatching carried on at Put in Bay, Ohio, and the county hatchery system in Monroe County, N. Y., where the Bureau operates an establishment which the local authorities have constructed. At Walhalla, S. C., unified efforts of the Bureau, the Forest Service, and local sportsmen have resulted in the construction of trout-rearing pools to be used in holding trout for distribution in surrounding waters. Cooperation with the State of Connecticut in the collection and distribution of smallmouth bass fry from closed waters was continued. Several of the Western States are still cooperating in the collection of black-spotted trout, being compensated by receiving a portion of the eggs. In Oregon and Washington the employees of the State and Federal hatcheries have closely coordinated their respective activities. The close relationships with the fish-cultural activities in the States of Maryland, Virginia, and West Virginia, were a continuation and extension of former policies.

Wherever the activities of the division have touched those of the United States Forest Service, the National Park Service, and the Bureau of Biological Survey, there has been evident a most gratifying willingness to cooperate. The two former agencies have aided by enabling the Bureau to procure from their warehouses supplies and materials needed for the Bureau's field work. This has resulted in decided economies. The Bureau of Biological Survey has directed its land-purchasing program in the Upper Mississippi Refuge so as to further the Bureau's fish-cultural work in that area as far as circumstances will permit. A full recital of the details of the various fields in which there has been joint and mutually beneficial action would be too voluminous.

An act passed by Congress in March 1934, known as the Coordinating Bill (Pub. No. 121) gave formal recognition to the necessity for closer relationships on the part of Federal agencies whose functions have to do with wildlife resources. Such organizations as the Bureau of Indian Affairs and the Reclamation Service are required to consult with the Bureau of Fisheries and/or the Bureau of Biological Survey when the welfare of fish and game is affected by the functions of the first-named organization. The act further authorizes investigation of the pollution problem and calls for a program for the protection of

wildlife on Indian lands and reservations. There is also definite authorization for broad cooperation between Government conservation bureaus and all other agencies functioning in this field. No funds or machinery to enable the Bureaus concerned to carry out these aims are authorized, however. The value of the legislation has already been demonstrated by several instances wherein the Bureau of Fisheries has been consulted in connection with problems arising from developments on Indian reservations.

The Bureau has continued to aid private sportsmen's organizations and conservation groups by furnishing advice on fish-cultural problems and by the maintenance of the nursery or rearing-pond system. The development of trout or bass-rearing pools is generally one of the first tasks considered by a sportsmen's organization. The States are now active in developing this program which was largely pioneered by the Bureau and as a consequence there has been further reduction in the number of nurseries operated under the auspices of the Bureau. In 1934 there were 62 individual units in comparison with 88 in 1933. The number of fish supplied totaled 2,846,700 as against 3,561,350 the previous year. There follows a tabular statement showing details of this activity. It may be added that the Bureau has benefited greatly by the existence of the private conservation organizations, particularly those of national scope, owing to the readiness with which these groups can develop a public opinion favorable to true conservation principles and to the Bureau's objectives.

*Cooperative nurseries and rearing ponds supervised by the Bureau in 1934*

Locality	Number of fish supplied	Kind	Locality	Number of fish supplied	Kind
Alabama: Citronelle.....	32,000	Largemouth black bass.	New York: Arena.....	15,000	Lock Leven trout.
Iowa: Hopkinton.....	2,000	Do	Beaver Falls.....	3,000	Brook trout.
Massachusetts:			Lowville.....	19,000	Do.
Adams.....	25,000	Brook trout.	Malone.....	58,500	Do.
Springfield.....	25,000	Do.	North Franklin.....	20,500	Do.
Michigan:			Do.....	33,000	Rainbow trout.
Au Sable.....	75,000	Do.	Do.....	14,000	Lock Leven trout.
Do.....	25,000	Rainbow trout.	Pennsylvania:		
Charlevoix.....	12,500	Brook trout.	Bethlehem.....	25,000	Brook trout.
Do.....	25,000	Rainbow trout.	Coatesville.....	7,500	Do.
Harrison.....	160,000	Brook trout.	Do.....	20,000	Rainbow trout.
Do.....	10,000	Rainbow trout.	Fairmont Springs.....	21,000	Brook trout.
Highland.....	10,000	Brook trout.	Do.....	10,000	Lock Leven trout.
Hillman.....	75,000	Do.	Franklin.....	10,000	Do.
Do.....	25,000	Rainbow trout.	Do.....	25,000	Rainbow trout.
National City.....	100,000	Brook trout.	Do.....	15,000	Lock Leven trout.
Vanderbilt.....	25,000	Rainbow trout.	Hazleton.....	15,000	Brook trout.
Do.....	75,000	Brook trout.	Johnstown.....	7,000	Do.
Mississippi: Orange Grove.....	38,000	Largemouth black bass.	Do.....	10,000	Rainbow trout.
Minnesota:			Kane.....	4,000	Brook trout.
Anoka.....	5,200	Brook trout.	Marienville.....	4,000	Do.
Houston.....	6,600	Lock Leven trout.	Do.....	20,000	Lock Leven trout.
Kason.....	4,500	Largemouth black bass.	Muncy.....	10,000	Brook trout.
Kenyon.....	5,000	Rainbow trout.	Do.....	10,000	Lock Leven trout.
Lake City.....	7,200	Brook trout.	Oil City.....	7,500	Brook trout.
Do.....	4,000	Rainbow trout.	Do.....	20,000	Rainbow trout.
Minneapolis.....	15,200	Lock Leven trout.	Do.....	10,000	Lock Leven trout.
Northfield.....	4,000	Rainbow trout.	Scranton.....	30,000	Do.
Red Wing.....	2,000	Brook trout.	Do.....	30,000	Brook trout.
Do.....	2,400	Rainbow trout.	Spring Mills.....	10,000	Rainbow trout.
Winona.....	9,600	Lock Leven trout.	Do.....	10,000	Brook trout.
			Weikert.....	40,200	Rainbow trout.
			Do.....	15,000	Lock Leven trout.

*Cooperative nurseries and rearing ponds supervised by the Bureau in 1934—Contd.*

Locality	Number of fish supplied	Kind	Locality	Number of fish supplied	Kind
Pennsylvania—Con.			Wisconsin—Con.		
White Haven.....	16, 400	Brook trout.	Eau Claire.....	23, 500	Brook trout.
Do.....	18, 000	Rainbow trout.	Do.....	25, 000	Rainbow trout.
Williamsport.....	70, 000	Brook trout.	Elmwood.....	3, 000	Brook trout.
Punxsutawney.....	4, 000	Do.	Ellsworth.....	5, 000	Lock Leven trout.
Vermont:			Elroy.....	15, 000	Brook trout.
Averill.....	68, 000	Do.	Galesville.....	20, 000	Do.
Do.....	25, 000	Atlantic salmon.	Gays Mills.....	5, 000	Do.
Do.....	20, 000	Landlocked salmon	Hazel Green.....	12, 000	Do.
West Virginia:			Independence.....	25, 000	Do.
Marlinton.....	600, 000	Brook trout.	La Crosse.....	10, 000	Do.
Do.....	372, 000	Rainbow trout.	Do.....	15, 000	Lock Leven trout.
Wisconsin:			Madison.....	3, 000	Brook trout.
Appleton.....	5, 000	Brook trout.	Do.....	3, 000	Rainbow trout.
Arcadia.....	10, 000	Do.	Do.....	3, 000	Lock Leven trout.
Blue River.....	2, 800	Do.	Manitowoc.....	20, 000	Do.
Do.....	2, 800	Rainbow trout.	Mindoro.....	15, 000	Brook trout.
Do.....	2, 800	Lock Leven trout.	Do.....	9, 000	Rainbow trout.
Boscobel.....	5, 000	Rainbow trout.	Monroe.....	28, 000	Do.
Do.....	20, 000	Brook trout.	Mountain.....	10, 000	Do.

### SALVAGE OPERATIONS

The removal and transfer to other waters of 22,873,000 fish taken in land-locked sloughs along the Upper Mississippi River was sharply below the normal extent of this work. In an average season, 50,000,000 fish may be salvaged and in some seasons as many as 75,000,000. The curtailment was due mainly to the reduced appropriations, which made it impossible to put sufficient crews into the field to cover the territory. As usual the greater proportion of the rescued fish were returned directly to the open waters of the Mississippi River. Greater dependence is being placed upon the fish produced in artificial ponds within the refuge for distribution in distant sections. In this connection one of the C. W. A. projects mentioned previously was the construction of a large pond within the refuge near Genoa, Wis. The rescue work is largely supported by funds appropriated for administration of fishery matters in the Upper Mississippi Wild Life Refuge.

*Number and disposition of fish rescued, fiscal year 1934*

Locality and species	Delivered to applicants	Restored to original waters	Total number fish rescued
All stations:			
Buffalo.....		82, 000	82, 000
Carp.....		1, 254, 000	1, 254, 000
Catfish.....	62, 000	4, 797, 600	4, 859, 600
Crappie.....	56, 700	9, 357, 600	9, 414, 300
Largemouth black bass.....	316, 400	925, 500	1, 241, 900
Fresh-water drum.....		6, 600	6, 600
Pike and pickerel.....		72, 900	72, 900
Smallmouth black bass.....	20, 700		20, 700
Sunfish.....	62, 000	2, 034, 100	2, 096, 100
White bass.....		19, 000	19, 000
Yellow perch.....	24, 100	2, 016, 100	2, 040, 200
Miscellaneous fishes.....		2, 766, 400	2, 766, 400
Total.....	541, 900	23, 331, 800	23, 873, 700
Summary by stations:			
Fairport, Iowa.....	14, 000	718, 800	732, 800
Homer, Minn.....	325, 300	19, 887, 800	20, 213, 100
La Crosse, Wis.....	28, 300	1, 674, 500	1, 702, 800
Refuge and cooperative ponds.....	174, 300	1, 056, 700	1, 225, 000
Total.....	541, 900	23, 331, 800	23, 873, 700



### ASSIGNMENTS OF FISH EGGS TO STATES, TERRITORIES, AND FOREIGN COUNTRIES

The Bureau of Fisheries as usual served as the primary source of supply for a considerable number of fish eggs utilized at State hatcheries throughout the country. While the number of eggs supplied to the States was greatly in excess of that of the previous year a large proportion of the increase was due to the transfer of 830,000,000 pike perch eggs to the State hatchery in Ohio. These eggs were collected by the Bureau but the State's equipment was used in incubating them. However, making allowance for this circumstance, the assignment was approximately 43,850,000 in comparison with 39,171,000 for the previous year. They were furnished to 23 States in comparison with 22 which were the recipients of eggs the previous year. It is hoped to expand this feature of the work as far as possible in line with the program of closer cooperation with the State fish and game departments.

It should be further pointed out that many of the States, particularly in the West, cooperated in the collection of trout eggs and are consequently receiving eggs as compensation for their joint efforts.

With reference to shipments of eggs to foreign countries, the usual allotments were made to Canada on an exchange basis and there was a continuation of experiments in the introduction of rainbow trout to Ecuador. A new development was the effort to establish rainbow trout in Puerto Rico. A shipment of eggs was received in fair condition and a goodly proportion hatched. There is ample indication that there is a limited area of water suitable for trout in this insular possession.

#### *Shipments of fish eggs to foreign countries, fiscal year 1934*

Country and species	Eggs
Canada:	
Black-spotted trout.....	1,250,000
Loch Leven trout.....	300,000
Ecuador: Rainbow trout.....	100,000
Puerto Rico: Rainbow trout.....	45,000
Total.....	1,695,000

#### *Assignments of fish eggs to State fish commissions, fiscal year 1934*

State and species	Number	State and species	Number
Arizona: Loch Leven trout.....	930,000	New Mexico:	
California:		Black-spotted trout.....	3,400,000
Brook trout.....	25,000	Loch Leven trout.....	1,000,000
Rainbow trout.....	125,000	Rainbow trout.....	731,000
Colorado: Loch Leven trout.....	1,500,000	North Carolina: Rainbow trout.....	100,000
Connecticut: Loch Leven trout.....	100,000	Ohio: Pike perch.....	830,075,000
Georgia:		Oregon:	
Loch Leven trout.....	151,000	Black-spotted trout.....	4,200,000
Rainbow trout.....	602,000	Chinook salmon.....	7,500,000
Idaho:		Loch Leven trout.....	300,000
Black-spotted trout.....	3,500,000	Rainbow trout.....	164,000
Rainbow trout.....	1,549,000	South Carolina: Rainbow trout.....	400,000
Maine:		South Dakota: Loch Leven trout.....	1,250,000
Brook trout.....	1,400,000	Tennessee: Rainbow trout.....	450,000
Lake trout.....	500,000	Utah: Loch Leven trout.....	1,000,000
Massachusetts:		Vermont:	
Loch Leven trout.....	100,000	Brook trout.....	1,100,000
Rainbow trout.....	200,000	Rainbow trout.....	35,000
Montana: Loch Leven trout.....	3,472,000	Washington:	
Nebraska:		Loch Leven trout.....	500,000
Loch Leven trout.....	200,000	Rainbow trout.....	110,000
Rainbow trout.....	425,000	Wyoming:	
Nevada: Rainbow trout.....	500,000	Black-spotted trout.....	3,100,000
New Hampshire: Brook trout.....	1,000,000	Loch Leven trout.....	2,033,000
		Total.....	373,885,000

## TRANSFER OF EGGS BETWEEN STATIONS

The Bureau is concentrating on the production of eggs of the different species of trout at the particular hatcheries where conditions are most suitable. This means economy in supplying the other hatcheries and avoids the necessity of utilizing valuable space and depleted funds for maintaining a brood stock at each hatchery to supply its own needs. The following table will indicate the extent to which this feature has been developed:

*Transfer of eggs between stations, fiscal year 1934*

Species	Number of eggs	From—	To—
Black-spotted trout.....	500,000	Bozeman, Mont.	Glacier Park, Mont.
	100,000	do	Springville, Utah.
	1,000,000	Yellowstone Park, Wyo.	Birdsview, Wash.
	250,000	do	Quilcene, Wash.
	5,958,000	do	Bozeman, Mont.
	2,200,000	do	Glacier Park, Mont.
	500,000	do	Madison Valley, Mont.
	400,000	do	Clackamas, Oreg.
	550,000	do	Butte Falls, Oreg.
	600,000	do	Crawford, Nebr.
	800,000	do	Hagerman, Idaho.
	200,000	do	Salmon, Idaho.
	600,000	do	Leadville, Colo.
	800,000	do	Creede, Colo.
	300,000	do	Quinault, Wash.
	150,000	do	Spearfish, S. Dak.
	700,000	do	Springville, Utah.
	1,000,000	do	Jackson Hole, Wyo.
Brook trout.....	320,000	Berkshire, Mass.	Nashua, N. H.
	2,281,000	Berlin, N. H.	St. Johnsbury, Vt.
	100,000	do	Rochester, N. Y.
	50,000	do	Flintville, Tenn.
	300,000	do	Nashua, N. H.
	300,000	do	Northville, Mich.
	1,100,000	do	White Sulphur Springs, W. Va.
	86,000	Madison Valley, Mont.	Bozeman, Mont.
	950,000	Craig Brook, Maine	Cape Vincent, N. Y.
	200,000	do	Barneveld, N. Y.
	300,000	do	Ithaca, N. Y.
	100,000	do	Duluth, Minn.
	655,000	do	Erwin, Tenn.
	14,000	do	Nashua, N. H.
	400,000	do	White Sulphur Springs, W. Va.
	700,000	do	Wytheville, Va.
	300,000	Leadville, Colo.	Bozeman, Mont.
	200,000	do	Duluth, Minn.
	100,000	do	Lake Mills, Wis.
	75,000	do	Eagle Nest Lake, N. Mex.
	300,000	do	Saratoga, Wyo.
	360,000	do	Springville, Utah.
	300,000	do	Bear Lake, Utah.
Chinook salmon.....	489,000	Creede, Colo.	Crawford, Nebr.
	204,000	do	Hagerman, Idaho.
	750,000	do	Saratoga, Wyo.
	15,000	Pittsford, Vt.	Leetown, W. Va.
	184,000	do	White Sulphur Springs, W. Va.
	1,132,000	Mills Creek, Calif.	Baird, Calif.
	60,000	Butte Falls, Oreg.	Clackamas, Oreg.
	25,000	Little White Salmon, Wash.	Central station, Washington, D. C.
	500,000	do	Clackamas, Oreg.
	1,500,000	do	Puget Sound stations, Wash.
Grayling.....	500,000	Yellowstone Park, Wyo.	Glacier Park, Mont.
	53,000	do	Salt Lake City, Utah.
Lake trout.....	15,000	Duluth, Minn.	Leadville, Colo.
Landlocked salmon.....	15,000	Craig Brook, Maine	Nashua, N. H.
	20,000	do	Bear Lake, Utah.
Loch Leven trout.....	150,000	Madison Valley, Mont.	Birdsview, Wash.
	16,373,000	do	Bozeman, Mont.
	179,000	do	Cape Vincent, N. Y.
	50,000	do	Ithaca, N. Y.
	75,000	do	Rochester, N. Y.

*Transfer of eggs between stations, fiscal year 1934—Continued*

Species	Number of eggs	From—	To—
Loch Leven trout—Con.	251,000	Madison Valley, Mont.	Crawford, Nebr.
	203,000	do.	Duluth, Minn.
	200,000	do.	Flintville, Tenn.
	250,000	do.	Hagerman, Idaho.
	751,000	do.	La Crosse, Wis.
	201,000	do.	Lake Mills, Wis.
	250,000	do.	Leadville, Colo.
	109,000	do.	Creede, Colo.
	202,000	do.	Leetown, W. Va.
	26,000	do.	Nashua, N. H.
	203,000	do.	Northville, Mich.
	559,000	do.	Saratoga, Wyo.
	603,000	do.	Spearfish, S. Dak.
	937,000	do.	Springville, Utah.
	300,000	do.	White Sulphur Springs, W. Va.
	62,000	Leadville, Colo.	Eagle Nest Lake, N. Mex.
Rainbow trout-----	100,000	Madison Valley, Mont.	Glacier Park, Mont.
	75,000	do.	Rochester, N. Y.
	100,000	do.	Bear Lake, Utah.
	82,000	Hagerman, Idaho.	Birdsview, Wash.
	835,000	Salmon, Idaho.	Hagerman, Idaho.
	500,000	Eagle Nest Lake, N. Mex.	Crawford, Nebr.
	650,000	do.	Leadville, Colo.
	1,075,000	do.	Creede, Colo.
	150,000	do.	Spearfish, S. Dak.
	103,000	Manchester, Iowa.	Duluth, Minn.
	210,000	do.	Hagerman, Iowa.
	309,000	do.	La Crosse, Wis.
	64,000	do.	Lake Mills, Wis.
	175,000	do.	Leadville, Colo.
	144,000	do.	Creede, Colo.
	306,000	do.	Northville, Mich.
	150,000	Neosho, Mo.	Bozeman, Mont.
	400,000	do.	Saratoga, Wyo.
	250,000	do.	Springville, Utah.
Sockeye salmon-----	500,000	Bourbon, Mo.	Bozeman, Mont.
	500,000	do.	Crawford, Nebr.
Whitefish-----	200,000	do.	Saratoga, Wyo.
	10,000	White Sulphur Springs, W. Va.	Central station, Washington, D. C.
	50,000	Wytheville, Va.	Barneveld, N. Y.
	75,000	do.	Rochester, N. Y.
	25,000	do.	Central station, Washington, D. C.
	180,000	do.	Flintville, Tenn.
	100,000	do.	Leetown, W. Va.
	348,000	Baker Lake, Wash.	Quilcene, Wash.
	400,000	Put in Bay, Ohio.	Central station, Washington, D. C.
	60,000	do.	Salt Lake City, Utah.

## OUTPUT OF FISH

The formal closure of a number of the hatcheries reduced the producing units for 1934 to a total of 83, comprising 42 main stations and 41 substations; this was a reduction of 8. Some of the establishments which are listed in the following table as being in operation were closed during the fiscal year so that at the end of the period a still smaller number of hatcheries was in operation. These stations are located in 38 States and the Territory of Alaska. The output was distributed to practically every State, however.

*Stations and substations operated and the output of each, fiscal year 1934*

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total <sup>1</sup>
Baird, Calif.: Chinook salmon.....			1, 168, 600	1, 168, 600
Battle Creek, Calif.: Chinook salmon.....			1, 379, 100	1, 379, 100
Mill Creek, Calif.: Chinook salmon.....	* 1, 132, 000		1, 177, 100	2, 309, 100
Baker Lake, Wash.: Silver salmon.....		6, 500		6, 500
Sockeye salmon.....			399, 000	399, 000
Birdsview, Wash.: Black-spotted trout.....			94, 910	94, 910
Brook trout.....			376, 000	376, 000
Chinook salmon.....		385, 000	350, 000	735, 000
Silver salmon.....		1, 076, 000	124, 000	1, 200, 000
Sockeye salmon.....			685, 000	685, 000
Steelhead salmon.....	* 110, 000		1, 145, 000	1, 255, 000
Mount Rainier, Wash.: Black-spotted trout.....			239, 900	239, 900
Brook trout.....			130, 000	130, 000
Loch Leven trout.....			86, 000	86, 000
Rainbow trout.....			94, 000	94, 000
Berkshire trout hatchery, Mass.: Brook trout.....			170, 855	170, 855
Smallmouth black bass.....			271	584, 271
Berlin, N. H.: Brook trout.....	* 2, 100, 000	<sup>2</sup> 674, 000	<sup>4</sup> 492, 160	3, 266, 160
St. Johnsbury, Vt.: Brook trout.....		<sup>3</sup> 2, 251, 256		2, 251, 256
Landlocked salmon.....			8, 025	8, 025
Loch Leven trout.....			15, 400	15, 400
Boothbay Harbor, Maine: Cod.....	1, 037, 262, 000			1, 037, 262, 000
Haddock.....	191, 754, 000			191, 754, 000
Winter flounder.....		809, 811, 000		809, 811, 000
Bozeman, Mont.: Black-spotted trout.....			2, 397, 900	2, 397, 900
Brook trout.....			<sup>6</sup> 418, 376	418, 376
Loch Leven trout.....			252, 050	252, 050
Rainbow trout.....			516, 600	516, 600
Glacier Park, Mont.: Black-spotted trout.....			1, 090, 297	1, 090, 297
Brook trout.....			2, 880	2, 880
Rainbow trout.....			179, 400	179, 400
Madison Valley, Mont.: Black-spotted trout.....			73, 440	73, 440
Brook trout.....			2, 300	2, 300
Loch Leven trout.....	* 16, 391, 450	7, 614, 500	1, 288, 200	25, 294, 190
Rainbow trout.....	* 50, 100		505, 600	555, 700
Miles City, Mont.: Largemouth black bass.....			<sup>7</sup> 35, 789	35, 789
Catfish.....			<sup>8</sup> 10, 476	10, 476
Crappie.....			<sup>9</sup> 26, 863	26, 863
Sunfish.....			<sup>10</sup> 108, 355	108, 355
Yellow perch.....			<sup>11</sup> 103, 259	103, 259
Miscellaneous.....			<sup>12</sup> 28, 239	28, 239
Cape Vincent, N. Y.: Brook trout.....		586, 720		586, 720
Lake trout.....		162, 500		162, 500
Loch Leven trout.....		111, 400		111, 400
Rainbow trout.....			14, 800	14, 800
Smallmouth black bass.....			28, 075	28, 075
Barneveld, N. Y.: Brook trout.....			89, 495	89, 495
Loch Leven trout.....			22, 700	22, 700
Rainbow trout.....			29, 392	29, 392

<sup>1</sup> Loss in transit 44, 159.<sup>2</sup> Includes 293,000 smallmouth black-bass fry turned over to the State of Connecticut in cooperative work.<sup>3</sup> Includes 400,000 fry brook trout turned over to the State of New Hampshire in cooperative work.<sup>4</sup> Includes 95,280 fingerling brook trout turned over to the State of New Hampshire and 96,000 fingerling brook trout turned over to the State of Vermont in cooperative work.<sup>5</sup> Includes 500,000 fry brook trout turned over to the State of New Hampshire and 900,000 fry brook trout turned over to the State of Vermont in cooperative work.<sup>6</sup> Includes 7,600 fingerling brook trout turned over to the State of Montana in cooperative work.<sup>7</sup> Includes 230,089 fingerling largemouth black bass turned over to the State of Montana in cooperative work.<sup>8</sup> Includes 8,372 fingerling catfish turned over to the State of Montana in cooperative work.<sup>9</sup> Includes 14,726 fingerling crappie turned over to the State of Montana in cooperative work.<sup>10</sup> Includes 73,235 fingerling sunfish turned over to the State of Montana in cooperative work.<sup>11</sup> Includes 74,217 fingerling yellowperch turned over to the State of Montana in cooperative work.<sup>12</sup> Includes 25,743 fingerling miscellaneous fishes turned over to the State of Montana in cooperative work.

## Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Cape Vincent, N. Y.—Continued.				
Ithaca, N. Y.:				
Brook trout.....			29,040	29,040
Rainbow trout.....			25,290	25,290
Rochester, N. Y.:				
Largemouth black bass.....			4,233	4,233
Smallmouth black bass.....			14,540	14,590
Watertown, N. Y.:				
Brook trout.....			143,050	143,050
Lake trout.....			50,938	50,938
Loch Leven trout.....			39,850	39,850
Rainbow trout.....			64,830	64,830
Clackamas, Oreg.:				
Brook trout.....			150,000	150,000
Chinook salmon.....			13 1,000,000	1,000,000
Loch Leven trout.....			14 140,000	140,000
Rainbow trout.....			15 215,000	215,000
Big White Salmon, Wash.:				
Black-spotted trout.....			105	105
Brook trout.....			16 115,500	115,500
Chinook salmon.....	*2,000,000		4,608,000	6,608,000
Loch Leven trout.....			17 8,850	8,850
Butte Falls, Oreg.:				
Black-spotted trout.....			18 320,240	320,240
Chinook salmon.....			927,176	927,176
Silver salmon.....		19 299,000	272,576	571,576
Steelhead salmon.....			20 316,230	316,230
Little White Salmon, Wash.:				
Chinook salmon.....	*5,500,000		7,776,000	13,276,000
Chum salmon.....		50,000	236,500	286,500
Sockeye salmon.....			100,141	100,141
Craig Brook, Maine:				
Brook trout.....	*1,400,000	85,000	866,075	2,351,075
Landlocked salmon.....			149,000	149,000
Grand Lake Stream, Maine:				
Atlantic salmon.....			20,890	20,890
Brook trout.....			35,265	35,265
Landlocked salmon.....			261,220	261,220
Crawford, Nebr.:				
Largemouth black bass.....			21 229,740	229,740
Black-spotted trout.....			492,000	492,000
Brook trout.....			267,525	267,525
Catfish.....			22 242,000	242,000
Crappie.....			7,500	7,500
Loch Leven trout.....			43,600	43,600
Rainbow trout.....			521,700	521,700
Rock bass.....			2,000	2,000
Sunfish.....			12,070	12,070
Yellow perch.....			38,000	38,000
Dexter, N. Mex.:				
Largemouth black bass.....			23 514,875	514,875
Catfish.....			7,400	7,400
Sunfish.....			36,950	36,950
Duluth, Minn.:				
Brook trout.....			197,500	197,500
Lake trout.....		623,000		623,000
Loch Leven trout.....			138,000	138,000
Pike perch.....		6,600,000		6,600,000
Rainbow trout.....			33,000	33,000
Whitefish.....		440,000		440,000
Edenton, N. C.:				
Largemouth black bass.....		24 147,000	25 39,688	186,688
Catfish.....			3,000	3,000
Crappie.....			26 3,525	3,525
Shad.....		3,500,000		3,500,000
Sunfish.....			27 10,300	10,300
White perch.....		600,000		600,000
Yellow perch.....		25 4,000,000	75	4,000,075
Erwin, Tenn.:				
Largemouth black bass.....			1,975	1,975
Brook trout.....			232,000	232,000
Rainbow trout.....			303,780	303,780
Rock bass.....			10,000	10,000
Sunfish.....			34,200	34,200

<sup>13</sup> Includes 150,000 fingerling chinook salmon turned over to the State of Oregon in cooperative work.<sup>14</sup> Includes 115,000 fingerling Loch Leven trout turned over to the State of Oregon in cooperative work.<sup>15</sup> Includes 215,000 fingerling rainbow trout turned over to the State of Oregon in cooperative work.<sup>16</sup> Includes 38,900 fingerling brook trout turned over to the State of Oregon and 36,500 fingerling brook trout turned over to the State of Washington in cooperative work.<sup>17</sup> Includes 7,850 fingerling Loch Leven trout turned over to the State of Washington in cooperative work.

## Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
<b>Fairport, Iowa:</b>				
Largemouth black bass .....			73, 195	73, 195
Buffalo fish .....		5, 000	<sup>29</sup> 37, 600	42, 600
Carp .....		290, 000	<sup>29</sup> 494, 850	784, 850
Catfish .....		5, 000	220, 000	225, 000
Crappie .....			35, 200	35, 200
Pike and pickerel .....			55	55
Smallmouth black bass .....			<sup>30</sup> 12, 020	12, 020
Sunfish .....			47, 407	47, 407
White bass .....			485	485
Miscellaneous fishes .....			16, 300	16, 300
<b>Flintville, Tenn.:</b>				
Largemouth black bass .....			8, 000	8, 000
Brook trout .....			14, 350	14, 350
Loch Leven trout .....			<sup>31</sup> 49, 500	49, 500
Rainbow trout .....			<sup>32</sup> 84, 000	84, 000
Smallmouth black bass .....			30	30
<b>Fort Humphreys, Va.: Shad</b>		6, 450, 000		6, 450, 000
<b>Dumfries, Va.:</b>				
Largemouth black bass .....			1, 420	1, 420
Sunfish .....			460	460
<b>Featherstone, Va.:</b>				
Largemouth black bass .....			462	462
Sunfish .....			6, 100	6, 100
<b>Lakeland, Md.:</b>				
Largemouth black bass .....			6, 163	6, 163
Crappie .....			100	100
Sunfish .....			33, 105	33, 105
<b>Hagerman, Idaho:</b>				
Black-spotted trout .....			360, 000	360, 000
Brook trout .....			60, 000	60, 000
Chinook salmon .....	*60, 000		159, 250	219, 250
Loch Leven trout .....			100, 000	100, 000
Rainbow trout .....	*30, 000		643, 000	673, 000
Steelhead salmon .....			<sup>33</sup> 127, 000	127, 000
<b>Salmon, Idaho:</b>				
Black-spotted trout .....			90, 150	90, 150
Rainbow trout .....	*100, 000		364, 670	464, 670
<b>La Crosse, Wis.:</b>				
Largemouth black bass .....			<sup>34</sup> 166, 100	166, 100
Brook trout .....			503, 050	503, 050
Carp .....			<sup>29</sup> 82, 100	82, 100
Catfish .....			<sup>35</sup> 665, 000	665, 000
Crappie .....			<sup>36</sup> 441, 000	441, 000
Lake trout .....	*500, 000			500, 100
Loch Leven trout .....			359, 200	359, 200
Pike and pickerel .....			7, 975	7, 975
Rainbow trout .....			262, 200	262, 200
Smallmouth black bass .....			<sup>37</sup> 6, 512	6, 512

<sup>18</sup> Includes 320,240 fingerling black-spotted trout turned over to the State of Oregon in cooperative work.<sup>19</sup> Includes 299,000 fry silver salmon turned over to the State of Oregon in cooperative work.<sup>20</sup> Includes 216,230 fingerling steelhead salmon turned over to the State of Oregon in cooperative work.<sup>21</sup> Includes 55,000 fingerling largemouth black bass turned over to the State of Wyoming in cooperative work.<sup>22</sup> Includes 50,000 fingerling catfish turned over to the State of Wyoming in cooperative work.<sup>23</sup> Includes 24,000 fingerling largemouth black bass turned over to the State of New Mexico in cooperative work.<sup>24</sup> Includes 37,000 fry largemouth black bass turned over to the State of North Carolina in cooperative work.<sup>25</sup> Includes 6,250 fingerling largemouth black bass turned over to the State of North Carolina in cooperative work.<sup>26</sup> Includes 600 fingerling crappie turned over to the State of North Carolina in cooperative work.<sup>27</sup> Includes 400 fingerling sunfish turned over to the State of North Carolina in cooperative work.<sup>28</sup> Includes 50,000 fry yellow perch turned over to the State of North Carolina in cooperative work.<sup>29</sup> All carp and buffalo fish shown in above table are planted in commercial areas of the Mississippi River.<sup>30</sup> Includes 900 fingerling smallmouth black bass turned over to the State of Illinois and 1,000 fingerling smallmouth black bass turned over to the State of Iowa in cooperative work.<sup>31</sup> Includes 23,000 fingerling Loch Leven trout turned over to the State of Tennessee in cooperative work.<sup>32</sup> Includes 37,000 fingerling rainbow trout turned over to the State of Tennessee in cooperative work.<sup>33</sup> Includes 45,000 fingerling steelhead salmon turned over to the State of Idaho in cooperative work.<sup>34</sup> Includes 400 fingerling largemouth black bass turned over to the State of Illinois and 39,720 fingerling largemouth black bass turned over to the State of Wisconsin in cooperative work.<sup>35</sup> Includes 400 fingerling catfish turned over to the State of Illinois and 128 fingerling catfish turned over to the State of Wisconsin in cooperative work.<sup>36</sup> Includes 1,950 fingerling crappie turned over to the State of Illinois and 7,450 fingerling crappie turned over to the State of Wisconsin in cooperative work.<sup>37</sup> Includes 2,500 fingerling smallmouth black bass turned over to the State of Wisconsin in cooperative work.

## Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
<b>La Crosse, Wis.—Continued.</b>				
Sunfish.....			<sup>36</sup> 159, 010	159, 010
Yellow perch.....			103, 300	103, 300
Miscellaneous fishes.....			73, 400	73, 400
<b>Bellevue, Iowa:</b>				
Buffalofish.....	<sup>29</sup> 4, 950, 000			4, 950, 000
Carp.....	<sup>29</sup> 4, 250, 000			4, 250, 000
<b>Ferryville, Wis.: Buffalofish.</b>	<sup>29</sup> 1, 800, 000			1, 800, 000
<b>Guttenberg, Iowa:</b>				
Buffalofish.....	<sup>29</sup> 975, 000			975, 000
Carp.....	<sup>29</sup> 2, 000, 000			2, 000, 000
<b>Homer, Minn.:</b>				
Largemouth black bass.....			<sup>38</sup> 997, 110	997, 110
Buffalofish.....			<sup>29</sup> 13, 350	13, 350
Carp.....			<sup>29</sup> 717, 905	717, 905
Catfish.....			<sup>40</sup> 3, 899, 300	3, 899, 300
Crappie.....			<sup>41</sup> 8, 680, 500	8, 680, 500
Fresh-water drum.....			6, 580	6, 580
Pike and pickerel.....			60, 100	60, 100
Smallmouth black bass.....			500	500
Sunfish.....			<sup>42</sup> 1, 574, 300	1, 574, 300
White bass.....			13, 550	13, 550
Yellow perch.....			1, 918, 375	1, 918, 375
Miscellaneous fishes.....			2, 331, 600	2, 331, 600
<b>Lake Mills, Wis.:</b>				
Largemouth black bass.....			11, 700	11, 700
Brook trout.....			47, 000	47, 000
Lock Leven trout.....			22, 000	22, 000
Rainbow trout.....			55, 000	55, 000
Smallmouth black bass.....			2, 000	2, 000
<b>Lynxville, Wis.: Smallmouth black bass.</b>			14, 250	14, 250
<b>Refuge and Cooperative Ponds, Upper Mississippi River:</b>				
Largemouth black bass.....			78, 000	78, 000
Buffalofish.....			34, 080	34, 080
Carp.....			35, 037	35, 037
Catfish.....			70, 348	70, 348
Crappie.....			269, 380	269, 380
Pike and pickerel.....			4, 755	4, 755
Smallmouth black bass.....			20, 750	20, 750
Sunfish.....			338, 590	338, 590
Yellow perch.....			18, 550	18, 550
White bass.....			4, 910	4, 910
Miscellaneous fishes.....			352, 100	352, 100
<b>Rochester, Ind.:</b>				
Largemouth black bass.....			<sup>43</sup> 112, 350	112, 350
Sunfish.....			300	300
Yellow perch.....			2, 400	2, 400
<b>Leadville, Colo.:</b>				
Black-spotted trout.....			475, 000	475, 000
Brook trout.....			4, 148, 130	4, 148, 130
Lake trout.....			14, 000	14, 000
Loch Leven trout.....			781, 000	781, 000
Rainbow trout.....			1, 047, 400	1, 047, 400
<b>Creede, Colo.:</b>				
Black-spotted trout.....			449, 500	449, 500
Brook trout.....	<sup>24</sup> 1, 620, 699		2, 285, 600	3, 906, 299
Loch Leven trout.....			71, 500	71, 500
Rainbow trout.....	<sup>24</sup> 244, 705		497, 620	742, 325
<b>Eagle Nest Lake, N. Mex.:</b>				
Brook trout.....			904, 500	904, 500
Loch Leven trout.....			16, 000	16, 000
Rainbow trout.....	<sup>24</sup> 784, 000		1, 112, 000	1, 896, 000

<sup>29</sup> All carp and buffalofish shown in above table are planted in commercial areas of the Mississippi River.  
<sup>36</sup> Includes 2,000 fingerling sunfish turned over to the State of Illinois and 18,660 fingerling sunfish turned over to the State of Wisconsin in cooperative work.

<sup>39</sup> Includes 31,610 fingerling largemouth black bass turned over to the State of Wisconsin in cooperative work.

<sup>40</sup> Includes 29,060 fingerling catfish turned over to the State of Wisconsin in cooperative work.

<sup>41</sup> Includes 8,550 fingerling crappie turned over to the State of Wisconsin in cooperative work.

<sup>42</sup> Includes 16,340 fingerling sunfish turned over to the State of Wisconsin in cooperative work.

<sup>43</sup> Includes 41,150 fingerling largemouth black bass turned over to the State of Indiana in cooperative work.

## Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Leetown, W. Va.:				
Brook trout.....			<sup>44</sup> 217, 654	217, 654
Loch Leven trout.....			<sup>45</sup> 74, 330	74, 330
Rainbow trout.....			<sup>46</sup> 144, 044	144, 044
Louisville, Ky.:				
Largemouth black bass.....		154, 000	9, 310	163, 310
Crappie.....			1, 225	1, 225
Rock bass.....			25, 575	25, 575
Smallmouth black bass.....		309, 500	<sup>47</sup> 3, 173	312, 673
Sunfish.....			<sup>48</sup> 24, 600	24, 600
Mammoth Spring, Ark.:				
Largemouth black bass.....			203, 400	203, 400
Rock bass.....			2, 360	2, 360
Smallmouth black bass.....		25, 000	159, 300	184, 300
Sunfish.....			44, 500	44, 500
Manchester, Iowa:				
Brook trout.....			167, 725	167, 725
Rainbow trout.....	* 1, 691, 000		<sup>49</sup> 153, 285	1, 844, 285
Rock bass.....			11, 000	11, 000
Smallmouth black bass.....			8, 500	8, 500
Nashua, N. H.:				
Brook trout.....			<sup>50</sup> 500, 500	500, 500
Catfish.....			300	300
Landlocked salmon.....			12, 600	12, 600
Rainbow trout.....			<sup>51</sup> 174, 600	174, 600
Smallmouth black bass.....		12, 000	445	12, 445
Neosho, Mo.:				
Largemouth black bass.....			215, 290	215, 290
Crappie.....			21, 230	21, 230
Rainbow trout.....	* 502, 000		33, 156	535, 156
Rock bass.....			3, 220	3, 220
Sunfish.....			21, 280	21, 280
Bourbon, Mo.: Rainbow trout.....	* 1, 000, 000			1, 000, 000
Langdon, Kans.:				
Largemouth black bass.....			23, 740	23, 740
Catfish.....			460	460
Crappie.....			2, 650	2, 650
Rock bass.....			2, 300	2, 300
Sunfish.....			1, 780	1, 780
Yellow perch.....			2, 540	2, 540
Natchitoches, La.:				
Largemouth black bass.....			45, 538	45, 538
Sunfish.....			331, 140	331, 140
Warmouth bass.....			12, 950	12, 950
Tishomingo, Okla.:				
Largemouth black bass.....			48, 992	48, 992
Catfish.....			2, 702	2, 702
Crappie.....			16, 400	16, 400
Rock bass.....			29	29
Sunfish.....			53, 705	53, 705
Warmouth bass.....			102	102
Yellow perch.....			1, 866	1, 866
Northville, Mich.:				
Largemouth black bass.....			23, 450	23, 450
Brook trout.....			<sup>52</sup> 707, 500	707, 500
Loch Leven trout.....			<sup>53</sup> 137, 465	137, 465
Rainbow trout.....			348, 500	348, 500
Smallmouth black bass.....			51, 900	51, 900
Steelhead salmon.....		72, 745		72, 745
Alpena, Mich.: Lake trout.....			318, 500	318, 500

<sup>44</sup> Includes 3,400 fingerling brook trout turned over to the State of West Virginia in cooperative work.<sup>45</sup> Includes 5,000 fingerling Loch Leven trout turned over to the State of West Virginia in cooperative work.<sup>46</sup> Includes 8,197 fingerling rainbow trout turned over to the State of Maryland, 25,000 fingerling rainbow trout turned over to the State of Pennsylvania, 16,200 fingerling rainbow trout turned over to the State of Virginia, and 5,750 fingerling rainbow trout turned over to the State of West Virginia in cooperative work.<sup>47</sup> Includes 30,000 fry smallmouth black bass turned over to the State of Kentucky in cooperative work.<sup>48</sup> Includes 19,000 fingerling sunfish turned over to the State of Kentucky in cooperative work.<sup>49</sup> Includes 160,500 fingerling rainbow trout turned over to the State of Iowa in cooperative work.<sup>50</sup> Includes 255,000 fingerling brook trout turned over to the State of New Hampshire in cooperative work.<sup>51</sup> Includes 124,000 fingerling rainbow trout turned over to the State of New Hampshire in cooperative work.<sup>52</sup> Includes 27,500 fingerling brook trout turned over to the State of Indiana in cooperative work.<sup>53</sup> Includes 23,000 fingerling Loch Leven trout turned over to the State of Indiana and 65,000 fingerling Loch Leven trout turned over to the State of Ohio in cooperative work.



## Stations and substations operated and the output of each, fiscal year 1934—Continued

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Orangeburg, S. C.:				
Largemouth black bass.....			<sup>44</sup> 228, 796	228, 796
Catfish.....			3, 628	3, 628
Crappie.....			272	272
Shad.....		1, 624, 000		1, 624, 000
Sunfish.....			93, 932	93, 932
Warmouth bass.....			670	670
Yellow perch.....			3, 425	3, 425
Put in Bay, Ohio:				
Pike perch.....	* 830, 025, 000			830, 025, 000
Whitefish.....	* 60, 000	<sup>45</sup> 8, 850, 000		8, 910, 000
Pittsford, Vt.:				
Brook trout.....	* 25, 000		80, 935	105, 935
Rainbow trout.....			5, 375	5, 375
Quinault, Wash.:				
Brook trout.....			<sup>46</sup> 343, 100	343, 100
Chinook salmon.....			124, 400	124, 400
Silver salmon.....			129, 350	129, 350
Sockeye salmon.....		5, 450, 000	2, 620, 000	8, 070, 000
Quilcene, Wash.:				
Brook trout.....			264, 000	264, 000
Chinook salmon.....			355, 000	355, 000
Chum salmon.....		4, 817, 000		4, 817, 000
Humpback salmon.....		24, 175		24, 175
Rainbow trout.....			65, 000	65, 000
Silver salmon.....			487, 000	487, 000
Sockeye salmon.....			267, 000	267, 000
Steelhead salmon.....			290, 500	290, 500
Duckabush, Wash.:				
Brook trout.....			63, 000	63, 000
Chinook salmon.....		373, 600		373, 600
Chum salmon.....		6, 754, 000		6, 754, 000
Humpback salmon.....		114, 500		114, 500
Silver salmon.....		48, 000	90, 000	138, 000
Steelhead salmon.....			53, 500	53, 500
San Marcos, Tex.:				
Largemouth black bass.....		104, 500	156, 885	261, 385
Catfish.....			4, 415	4, 415
Crappie.....			3, 636	3, 636
Rio Grande perch.....			8, 840	8, 840
Sunfish.....			66, 625	66, 625
Lake Worth, Tex.:				
Largemouth black bass.....			385, 265	385, 265
Catfish.....			2, 765	2, 765
Crappie.....			13, 690	13, 690
Sunfish.....			64, 000	64, 000
Warmouth bass.....			800	800
Saratoga, Wyo.:				
Black-spotted trout.....			707, 935	707, 935
Brook trout.....			1, 461, 970	1, 461, 970
Loch Leven trout.....			639, 610	639, 610
Rainbow trout.....			677, 630	677, 630
Spearfish, S. Dak.:				
Brook trout.....			<sup>47</sup> 796, 670	796, 670
Loch Leven trout.....			493, 455	493, 455
Rainbow trout.....			1, 003, 825	1, 003, 825
Springville, Utah:				
Largemouth black bass.....			5, 039	5, 039
Black-spotted trout.....			337, 000	337, 000
Brook trout.....			<sup>48</sup> 491, 850	491, 850
Loch Leven trout.....			463, 076	463, 076
Rainbow trout.....	* 50, 220		1, 620, 108	1, 670, 328
Bear Lake, Utah:				
Brook trout.....			660, 550	660, 550
Landlocked salmon.....			43, 291	43, 291
Tupelo, Miss.:				
Largemouth black bass.....		27, 000	325, 880	352, 880
Sunfish.....			209, 839	209, 839
Marion, Ala.:				
Largemouth black bass.....		7, 000	132, 698	139, 698
Crappie.....			600	600
Sunfish.....			157, 850	157, 850

<sup>44</sup> Includes 50,100 fingerling largemouth black bass turned over to the State of South Carolina in cooperative work.<sup>45</sup> Turned over to the State of Ohio in cooperative work.<sup>46</sup> Includes 266,000 fingerling brook trout turned over to the State of Washington in cooperative work.<sup>47</sup> Includes 500 fingerling brook trout turned over to the State of South Dakota in cooperative work.<sup>48</sup> Includes 65,000 fingerling brook trout turned over to the State of Utah in cooperative work.

*Stations and substations operated and the output of each, fiscal year 1934—Continued*

[Asterisk (\*) denotes transfer of eggs to outside agencies]

Stations, substations, and species	Eggs	Fry	Fingerlings, yearlings, and adults	Total
Valdosta, Ga.:				
Largemouth black bass.....	-----	-----	<sup>59</sup> 39, 240	39, 240
Catfish.....	-----	-----	600	600
Sunfish.....	-----	-----	<sup>60</sup> 7, 275	7, 275
Warm Springs, Ga.:				
Largemouth black bass.....	-----	60, 000	222, 150	282, 150
Sunfish.....	-----	-----	429, 000	429, 000
White Sulphur Springs, W. Va.:				
Largemouth black bass.....	-----	-----	7, 550	7, 550
Brook trout.....	-----	-----	<sup>61</sup> 1, 821, 202	1, 821, 202
Loch Leven trout.....	-----	-----	169, 606	169, 606
Rainbow trout.....	*200, 900	-----	<sup>62</sup> 834, 662	1, 035, 562
Rock bass.....	-----	-----	3, 521	3, 521
Sunfish.....	-----	-----	3, 241	3, 241
Woods Hole, Mass.:				
Mackerel.....	-----	2, 946, 000	-----	2, 946, 000
Winter flounder.....	*46, 077, 000	81, 474, 000	-----	127, 551, 000
Wytheville, Va.:				
Largemouth black bass.....	-----	-----	5, 398	5, 398
Brook trout.....	-----	-----	<sup>63</sup> 377, 140	377, 140
Catfish.....	-----	-----	2, 000	2, 000
Loch Leven trout.....	-----	-----	3, 000	3, 000
Rainbow trout.....	*1, 205, 000	-----	<sup>64</sup> 826, 085	2, 031, 085
Rock bass.....	-----	-----	24, 876	24, 876
Smallmouth black bass.....	-----	-----	2, 505	2, 505
Sunfish.....	-----	-----	<sup>65</sup> 85, 435	85, 435
Yellowstone Park, Wyo.:				
Black-spotted trout.....	*17, 015, 000	-----	8, 300, 000	25, 315, 000
Grayling.....	*219, 000	4, 950, 320	-----	5, 169, 320
Yes Bay, Alaska: Sockeye salmon.....	-----	-----	14, 073, 000	14, 073, 000

<sup>59</sup> Includes 10,500 fingerling largemouth black bass turned over to the State of Georgia in cooperative work.<sup>60</sup> Includes 2,015 fingerling sunfish turned over to the State of Georgia in cooperative work.<sup>61</sup> Includes 861,912 fingerling brook trout turned over to the State of West Virginia in cooperative work.<sup>62</sup> Includes 448,650 fingerling rainbow trout turned over to the State of West Virginia in cooperative work.<sup>63</sup> Includes 77,100 fingerling brook trout turned over to the State of Virginia in cooperative work.<sup>64</sup> Includes 107,000 fingerling rainbow trout turned over to the State of North Carolina and 124,500 fingerling rainbow trout turned over to the State of Virginia in cooperative work.<sup>65</sup> Includes 4,800 fingerling sunfish turned over to the State of Virginia in cooperative work.

## EGG COLLECTIONS

The drop in the collection of eggs or the raw material of the hatchery operations is comparable to the decline in the total output. It will be noted from the following table that the collection of eggs of the game fish, particularly the trout, was equal to or above the records of the previous year. The decline occurred chiefly in the commercial species although there was a marked increase in the take of pike-perch eggs. Both the cod and winter flounder eggs were taken in numbers in excess of one billion each, even though operations for these species were conducted on a curtailed basis. It is not possible to compare the egg collections for the year with the output for the same period and determine the percentage mortality by this means, owing to the fact that a considerable number of game fish are held over for distribution as fingerlings and consequently will appear in the output figures for the succeeding year.

*Comparisons of egg collections, fiscal years 1933 and 1934*

Species	1933	1934	Species	1933	1934
Shad.....	27,355,000	17,104,000	Brook trout.....	23,833,130	28,331,758
Whitefish.....	211,452,500	12,000,000	Dolly Varden trout.....	175,000	
Chinook salmon.....	55,268,300	28,323,000	Grayling.....	2,118,400	2,118,400
Chum salmon.....	22,651,000	12,370,000	Pike perch.....	296,925,000	840,920,300
Humpback salmon.....	3,082,500	158,000	Yellow perch.....	125,020,000	6,430,000
Silver salmon.....	5,885,000	2,148,000	White perch.....	5,400,000	1,600,000
Sockeye salmon.....	62,566,800	9,157,000	Cod.....	2,121,060,000	1,037,262,000
Steelhead salmon.....	3,065,300	905,000	Haddock.....	747,192,000	191,754,000
Landlocked salmon.....	3,840,000	35,300	Pollock.....	19,429,000	
Rainbow trout.....	22,414,700	25,770,253	Winter flounder.....	3,532,946,000	1,036,626,000
Black-spotted salmon.....	26,667,700	28,946,550	Mackerel.....	7,164,000	8,592,000
Lock Leven trout.....	22,881,100	29,329,624			
Lake trout.....	33,414,000	1,850,120	Total.....	7,490,472,430	3,315,039,305

## NOTES ON OPERATIONS

## COMMERCIAL SPECIES

*Pacific salmon.*—The output of salmon from the Pacific coast hatcheries showed a decline for all species. This was caused by the closure of the Alaska hatcheries and the curtailment of work in the States. There has, however, been a gradual increase in the output of the game fishes which accordingly contributed to the increase in the total of these forms.

The Afognak (Alaska) station was closed at the start of the year and the Yes Bay (Alaska) station was closed shortly afterward but had distributed over 14,000,000 fingerling sockeye salmon which were on hand at the opening of the period.

In the Columbia River territory operations were carried on at 5 permanent stations and 1 egg-collecting unit with headquarters at the Clackamas (Oreg.) station. The total egg collection of the field for the entire year proved quite disappointing as only 27,000,000 eggs were secured in comparison with 60,500,000 during the preceding year. In some instances the decrease was a direct result of curtailment of funds while at other points, as at the Rogue River substation, abnormal water conditions were responsible. The take of eggs at both the Big White and Little White Salmon substations was markedly reduced for reasons which cannot be explained other than to state that the run of fish was below normal.

The Clackamas (Oreg.) station was the beneficiary of a C. W. A. project which resulted in the construction of additional rearing ponds, development of a water-supply reservoir, and repairs to some of the buildings.

The Salmon (Idaho) substation was closed during the greater part of the year but was utilized for the eyeing of salmon eggs and the rearing of trout eggs collected locally.

The Quinault (Wash.) substation had a subnormal collection of sockeye salmon eggs arising from severe floods interfering with seining operations during the egg-collecting season. Further effort was devoted to rearing the maximum number of sockeyes to fingerling size before distribution. This station initiated the culture of trout on a more intensive scale, distributing over 300,000 brook trout. A C. W. A. project was approved for the Quinault station, resulting in the construction of one rearing pond, the grading of the station grounds, and the installation of several hundred feet of curbing.

During the fiscal year the Quilcene and Duckabush (Wash.) stations were transferred to the jurisdiction of the Quinault station. As usual these two establishments concentrated on the propagation of chum salmon, eggs of which are available in large numbers. However, other species of salmon, including silvers, humpbacks, steelheads, chinooks, and eastern brook trout were also handled.

At the Birdview (Wash.) station operations other than of a fish-cultural and routine nature consisted of the installation of a concrete floor in the hatchery, the diversion of Grandy Creek to the Skagit River in order to avoid the possibility of flooding the station grounds, and the partial completion of an additional cottage for residence purposes. Experiments in the marking of sockeye salmon fingerlings for securing life history information were continued.

The Baker Lake (Wash.) substation received only a limited number of salmon eggs owing to exceptionally poor runs. Over one-half million trout eggs of the four species were shipped in with the object of concentrating on the propagation of trout at this point in the future. The new road giving access to this hatchery was completed during the year.

The Mount Rainier substation incubated a total of 1,000,000 trout eggs for the production of fish to be used in stocking waters of the national park. Throughout the year considerable trouble was experienced with various diseases.

In the California field various improvements were made to the Baird hatchery and substations through C. W. A. allotments. The fish cultural activities were substantially the same as in the previous year.

#### GREAT LAKES SPECIES

The output of the commercial forms of the Great Lakes was greatly reduced with the exception of pike perch. The two Michigan substations, auxiliaries of the Northville (Mich.) station, were closed early in the fiscal year and achieved no output except several hundred thousand lake trout which were being reared by the Alpena (Mich.) substation. These were planted early in the year.

The field of operations of the Duluth (Minn.) station was greatly restricted owing to the fact that no fishing was allowed during the closed season for the purpose of taking whitefish or lake trout eggs. A few days fishing after the closed season was ended permitted the collection of 1,500,000 lake trout eggs. Under the same conditions approximately 500,000 whitefish eggs were obtained. Eggs of game trout were incubated and distributed from this point. Cooperative arrangements were effected with the Minnesota Fish and Game Department to handle the collection of pike-perch eggs in the spring, but the run was light, yielding only approximately 7,000,000 eggs.

At the Put in Bay (Ohio) station the sudden advent of cold weather resulted in the cessation of fishing for whitefish before it was possible to secure a large number of eggs, so that only 11,500,000 were obtained. However, the spring collection of pike-perch eggs was the largest since the station has been in operation. The collections of this species amounted to 830,000,000, of which over 500,000,000 were incubated at the Ohio State hatchery, the balance being handled at the Bureau's station. This hatchery was operated under cooperative

arrangements with the State of Ohio, whereby that agency attended to the distribution.

The Cape Vincent (N. Y.) station was much more active in connection with the propagation of game fish than with the commercial varieties. Only 250,000 lake trout eggs were obtained, no whitefish being handled. The curtailment in this phase of the station's activity was caused by a lack of funds to permit the placing of spawntakers.

#### MARINE STATIONS

The production of marine species was obtained from two hatcheries only, the establishment at Gloucester (Mass.) being placed out of commission.

The Woods Hole (Mass.) hatchery was kept open, inasmuch as it was also a base for scientific investigations. A few brood cod were secured but owing to the limited numbers and the expense of pumping water to retain them until the eggs were matured, they were discarded and no eggs of this species were handled. The station undertook the propagation of flounder during the month of January, but extreme weather conditions proved to be an insurmountable obstacle; and in order to save the nets it was necessary to discontinue this attempt after a moderate number of eggs, amounting to 136,000,000, were secured. A limited number of mackerel eggs were collected and hatched later in the year.

All of the buildings were repainted, both interior and exterior, and a number of minor improvements were made.

At the Boothbay Harbor (Maine) station activities were somewhat curtailed owing to the lack of funds. However, in spite of this handicap and unfavorable weather conditions, 900,000,000 flatfish eggs were secured and incubated, which is approximately one-third of the number handled the previous year.

With the cod, an increase in the number of eggs was obtained owing to the fact that the market fishermen were taking an increased number of fish and the Bureau was able at moderate cost to salvage the eggs and either hatch them or plant them after fertilization on the spawning grounds.

There was also a drop in the yield of haddock to a level approximately one-third of last year's output.

Through a P. W. A. allotment a considerable number of necessary repairs were made including replanking the main wharf, reconditioning the dwellings, and painting the station buildings.

#### ANADROMOUS SPECIES OF THE ATLANTIC COAST

The only station devoted exclusively to the propagation of commercial species native to the coastal rivers of the Atlantic coast is the Fort Humphreys (Va.) station. The propagation of shad is the main activity. No effort was made to hatch yellow perch at this point because of the shortage of funds. The same reason impelled the curtailment of shad work with a take of 6,500,000 eggs in comparison with normal collections of twice or three times this amount. Shad were also propagated at the Edenton (N. C.) station where results were more favorable. The output of shad at this point amounted to approximately 3,500,000 fry. Very little success attended the effort to propagate glut herring. This was partly caused by the fact that

the run of fish appeared to spawn within a very short period before an adequate number of spawntakers could be employed. This station also handled yellow perch as in previous years, securing about 4,000,000 fry. Limited attention was given to the propagation of white perch, and a small output of 90,000 fry was obtained. Shad were also propagated in cooperation with the State of South Carolina on the Edisto River, this work being handled by the Orangeburg (S. C.) station. A production approximately equivalent to the normal average was obtained and planted in local waters.

The only other commercial species in this category which has been handled by the Bureau in recent years was the Atlantic salmon. However, owing to inability to secure the usual supply of eggs from the Canadian Government, the Craig Brook (Maine) station at which this work is conducted, made distribution of only 20,000 Atlantic salmon which were held over from the previous fiscal year.

#### GAME FISH PROPAGATION

The increasing demand for wider participation of the Federal Government in the conservation of natural resources, particularly in the fields of forestation, water conservation, and the replenishment and protection of wildlife, has confirmed the importance of the Bureau's activities in the propagation of game fish. It was decided, therefore, to concentrate attention upon the propagation and distribution of those forms which are required to maintain good fishing in the public domain and in all public waters. The relative proportion of game fish in the total hatchery output increased therefore from approximately 2 percent to 4.1 percent. Strictly game forms distributed by the division numbered 135,000,000 during the fiscal year. It was not possible, owing to depleted funds, to rear as large a portion of these fish to as large a size as the requirements for practical fish-cultural work would dictate. Furthermore, the output was maintained by concentrating upon production and calling upon the public, particularly sportsmen's organizations, to cooperate in meeting the distribution costs, thereby relieving the Bureau in part of one of its heaviest expenses. The Bureau made some distribution with its own facilities including the fish cars where long hauls were involved. There was a definite increase in the output of 10 different varieties of game fish. Included in these were all the important varieties of trout, and the largemouth and smallmouth bass.

#### ROCKY MOUNTAIN TERRITORY

A small increase in personnel was provided for the Salt Lake City (Utah) headquarters owing to the fact that supervision of activities for both the Rocky Mountain territory and the Pacific coast section was consolidated in this office. Aside from the normal direction of fish cultural activities, the district supervisor was also placed in general direction of the construction of fish screens as carried on under a P. W. A. allotment.

At the Yellowstone Park hatchery the collection of black-spotted trout eggs for the season of 1933-34, including parts of both fiscal years, exceeded all previous records with but one exception. The take amounted to over 28,000,000 eggs.

A hatchery building previously constructed at Grebe Lake was used for the incubation of grayling eggs. Over 2,000,000 eggs of this species were secured and yielded the unusually high percentage of hatch of 94.4 percent. Auxiliary rearing ponds were maintained at Mammoth Hot Springs, at which point 183,000 rainbow trout fingerlings were produced. It was reported that the catch of fish in Yellowstone Park increased approximately 16 percent over the previous year.

The collection of rainbow trout eggs from brood stock at the Springville (Utah) station was slightly more than half the take of the previous year, owing to the fact that the older fish are being discarded and a new brood stock is being built up. A few largemouth bass were produced at the hatchery in a small pond developed for this purpose. This station enjoyed the benefit of P. W. A. and C. W. A. allotments which permitted the construction of a concrete raceway nearly 600 feet in length for the improvement of the main water supply. It was also possible to effect other improvements, particularly to the grounds.

At the Bear Lake (Utah) substation special allotments permitted the construction of 3 concrete and 2 natural dirt rearing ponds. These could not be placed in use because of the construction of a new dam which affected the water supply. One million three hundred seventy-five thousand eggs were handled at this point and a satisfactory production and distribution was achieved from this source.

The Spearfish (S. Dak.) station had a very successful season with an output approximating the highest previous records. Extensive improvements to the grounds and buildings were placed in effect by virtue of a C. W. A. allotment. Probably the most important accomplishment was the construction of new rearing ponds and the improvement of old ones. Water-supply difficulties at this point were overcome by the laying of a pipe line to connect with the city water line.

The Saratoga (Wyo.) station also experienced one of the best seasons in its history as far as the output of fish is concerned, although the total collections of eggs were reduced as a result of discontinuing one of the field egg-collecting stations. It was possible to increase the take of eggs from the trout brood stock held at the station. Here, too, special allotments from the Federal relief organizations permitted extensive improvements including the painting of buildings, installation of curb and gutters, and improvements to drives as well as the construction of about 600 feet of stone wall along the creek running through the station grounds. The program for landscaping this station was continued with over 525 trees having been planted and much of the brush being removed.

In the Colorado territory, the Leadville station was operated along the usual lines. Among the improvements were the lowering of the ceiling in the hatching room so as to economize on heating. The pond system was overhauled and a new water-supply intake dam was constructed to feed the Crystal Lake auxiliary project.

The Creede (Colo.) substation increased its usefulness and importance in spite of depleted funds. Work was started on the erection of a new dwelling at this substation.

The Dexter, N. Mex., station propagates no trout in contrast with other stations in this field but serves an important territory where there is a heavy demand for pond fish, particularly bass. Due to fall in the water supply, it was necessary to undertake the distribution of

fish earlier than usual which resulted in an increase of 38 percent over the output for the previous fiscal year. The aid of the State fish and game department was enlisted in distributing the fish. Throughout the year improvements to the grounds, equipment, and buildings were under way. The provision of additional pond space has been continued and three new wells were drilled to add to the water supply. An office building was completed and two small pump houses were constructed.

The Bozeman, Mont., station is headquarters for important activities with auxiliaries located at Ennis and Miles City, Mont., where pondfish are propagated, and at Glacier Park. Fish cultural work at Bozeman was conducted with gratifying success, and extensive improvements with funds derived from P. W. A. and C. W. A. sources were provided. This consisted of reconditioning of the hatchery, the conversion of a stable into a duplex dwelling, improvements to the domestic water supply, construction of rearing ponds, and the starting of construction of an ice house and refrigerator room. The work in the Madison Valley was centered at Ennis, where a new hatchery was placed in active operation at the beginning of the fiscal year. The collection of Loch Leven trout eggs in this field amounting to 28,500,000 exceeded all previous records. The yield of pond fish at the Miles City auxiliary station was fully adequate to meet requirements. A change in policy was established by the practice of wintering the adult brood stock in a small leased lake rather than attempting to hold them in the larger Miles City ponds where previous experience has shown a heavy mortality during the winter. The total yield of fish from this source was over 316,000 which was below the record for the previous year but the fish appeared to be of larger size.

The Glacier Park substation was operated as usual, incubating eggs and rearing fingerlings shipped in from other hatcheries. Difficulty was experienced when the chlorinated water supply used by the Park Hotel gained access to the hatchery water supply and caused a heavy loss of fish. While this loss was serious for the present season, it is being easily controlled by the installation of a suitable valve.

#### NEW ENGLAND STATIONS

The Nashua, N. H., station carried on its activities in a normal manner with production approximating that of previous years.

At the Hartsville, Mass., station the full requirements for its own brook trout egg supply were met from the station's brood stock and over 300,000 were shipped elsewhere. A new cement dam was constructed for one of its rearing ponds and other improvements effected. The most outstanding feature was the collection, in cooperation with the State of Connecticut, of over 580,000 smallmouth bass fry from lakes in Connecticut which are closed to fishing. The fish obtained in this manner were divided in equal proportions between the State and the Bureau's applicants.

The activities of the St. Johnsbury, Vt., station were centered at the York Pond, N. H., auxiliary which has been under development for a number of years. The work at St. Johnsbury was confined to cooperative rearing of fish in conjunction with the State of Vermont. At the York Pond establishment the egg collections of brook trout amounted to over 9,700,000. In addition to the fish-cultural work at



this point extensive development has been under way through a P. W. A. allotment, the assignment of relief labor, and the utilization of C. C. C. workers. Among the accomplishments were the provision for a domestic water supply, the extension of the canal and pipe-line systems and the construction of a new power house and supply canal. Another important project was the rebuilding of Diversion Pond, one of the trout ponds which was washed out during a period of heavy rainfall. Numerous other jobs incidental to the development of this extensive project were also prosecuted during the year.

In Maine the Grand Lake Stream auxiliary was closed during the forepart of the fiscal year and the responsibility of its operation assumed by the Maine Department of Inland Fish and Game. All fish on hand amounting to over 500,000 landlocked salmon and brook trout were distributed prior to the transfer. The State of Maine under a working agreement furnished the Bureau with a limited number of landlocked salmon eggs which were formerly collected at this point.

At the main station located at Craig Brook, operations were successful and the collection of brook-trout eggs amounting to 7,385,000 exceeded all previous takes. A considerable amount of repair work was done on the ponds and drainage system, much of it being required by the severe winter which caused extensive damage. In contrast with previous years the services of a fish car were not utilized in distributing the output of fish. The fingerling salmon and trout were largely planted by inducing applicants to receive them at the hatchery.

#### COMBINATION TROUT AND POND-FISH STATIONS

Owing to the overlapping in the natural range of the trout and warm-water species such as bass, a number of hatcheries are called on to supply fish of both groups. Consequently, where natural conditions permit, the hatcheries are developed so as to propagate the two different types. However, as a rule, a hatchery suitable for the propagation of trout does not offer optimum conditions for breeding warm-water fish and as a consequence the latter activity is more or less supplementary and the output of bass, sunfish, etc., at the combination stations is usually of limited numbers.

The White Sulphur Springs (W. Va.) station duplicated its success of the previous year and handled approximately 5,400,000 trout eggs, producing an output of fish for distribution of over 3,000,000. Co-operative arrangements with the West Virginia Conservation Commission were again maintained, and the Bureau incubated 1,000,000 brook trout eggs for that agency. The output of warm-water species was improved in that the fish distributed were of larger size. Some improvements in the nature of widening and straightening the creek channel through the station grounds, and painting the station buildings were undertaken.

The Wytheville (Va.) station now functions as an important unit in the production of rainbow trout eggs, furnishing approximately 2,750,000. The output of trout from this station and its auxiliary seasonal rearing stations is eminently satisfactory. The bulk of the production of pond fish consisted of bream and rock bass. An electrical refrigerating system was installed as well as an electric pumping system for filling shipping cans. Aside from painting the station buildings, 1,000 feet of water supply pipe line was replaced.

The Manchester (Iowa) station also produced a large number of rainbow trout eggs but experienced an unfavorable season as far as the pond fish were concerned, owing to unfavorable weather conditions. The station cooperated with a local sportsmen's association in the establishment and operation of a large smallmouth bass rearing pond.

C. W. A. labor was used in effecting numerous minor improvements to the buildings and grounds.

At the Leetown (W. Va.) station an important activity has been the construction and development effected through a P. W. A. allotment. This covered the construction of a large reservoir and 5 new bass ponds ranging from 1 to 3 acres in area. Several of the older ponds were improved and the raceway system was entirely rebuilt and enlarged. Circular rearing pools were also completed. Further work was performed on the buildings including a concrete floor in the garage, and the finishing of the second floor of this building. Construction of a house for the director was started and was well underway at the end of the fiscal year. Fish-cultural activities yielded a large take of eggs but the percentage of fertility was low because of the fact that the eggs were taken from young fish. Effort was made to propagate smallmouth bass, but as the ponds were in readiness late in the season the brood stock could not be secured in time to yield a large number of fry. Experimental activities at Leetown are described in the annual reports of the Division of Scientific Inquiry.

The Flintville (Tenn.) station in its second year of operation distributed approximately 150,000 fingerling trout. Work with the rainbow species was successful but, as previously, heavy mortality was experienced with the brook trout and brown trout. Through the allotment of C. W. A. labor, seven bass ponds were constructed and the station grounds cleared up and improved. Owing to the delay in getting the ponds ready for use, the production of bass and other pond fish was negligible.

Activities at the Erwin (Tenn.) station were largely of a routine nature and the results comparable to those of previous years. Improvements were effected by the expenditure of a P. W. A. allotment permitting the dredging of mud from ponds and improvements to the buildings. The station handled 200,000 rainbow trout fingerlings on a cooperative basis whereby the Tennessee Fish and Game Department provided the food and arranged for the distribution during the fall of 1934.

The Cape Vincent (N. Y.) station showed indications of a limited fall production of smallmouth bass owing to failure of spawning. This station carried on its trout work at the three substations located at Cortland, Watertown, and Barneveld. The cooperative project at Rochester, N. Y., was also listed as one of the activities coming under the scope of the Cape Vincent station.

The Northville (Mich.) station conducted its fish-cultural work with average success and in addition carried on some improvements to the buildings and grounds.

Mention may be made of the new establishment at Lamar, Pa., the site for which had been acquired sometime previously. Active work commenced under a P. W. A. allotment in the fall of 1933 and consisted of remodeling a cottage into a dwelling for the superintendent. There was also erected a combination garage and workshop.

Two large trout ponds were completed, and a start was made on the construction of circular pools and raceways. Three hundred yards of road was built to service the new construction and the 153 acres of station property were cleared and trimmed of brush. Considerable fencing was moved, and a ditch was dug for the placement of a pipe line to run to the hatchery site. One hundred and twenty-five thousand brook and rainbow trout were shipped to the station in the spring with the intention of feeding them and rearing them for fall distribution.

#### POND-FISH STATIONS

The demand for the warm-water pond fish has continued unabated and the stations propagating this species have in a number of instances exceeded previous output. The provision of additional pond space is in most instances the only means whereby the production of bass, sunfish, crappie, etc., can be materially increased.

At Tupelo, Miss., one pond was enlarged in area and a concrete retaining wall was constructed for the protection of the pond embankments. The output of black bass and bream was of approximately normal proportions, but the distribution was restricted because of shortage of funds.

At the new Marion (Ala.) substation extensive construction work was under way during the year which resulted in the development of approximately 60 acres of pond space, together with an office building, shop, and garage, two dwellings, a reservoir, and several flowing wells for water supply. In spite of the construction and development activities the propagation of fish was also carried on with a distribution of over 300,000 bass and bream with approximately 100,000 fingerlings being held at the close of the year.

In the Texas field, the San Marcos station effected considerable improvements and developments including the replacement of the water-supply line, additional drainage facilities, construction of concrete ponds, and other general improvements. The output of bass was less than that of the previous year. This station continued the propagation of channel catfish with greater success than heretofore.

With a P. W. A. and C. W. A. allotment construction was started at a new hatchery at San Angelo, but at the close of the year work had not been carried to a point where this station could be placed in production.

The Fort Worth (Tex.) substation had the largest distribution of bass in its history.

The Orangeburg (S. C.) station was enlarged as to its pond space and the fish-cultural operations were of the usual effectiveness.

At both Tishomingo (Okla.) and Natchitoches (La.), extensive development work was under way. At the latter point adverse weather conditions resulted in very slow progress in the provision of additional pond space. Experimental work in the propagation of bass has been carried on at the Natchitoches station, a biologist being detailed to carry on this activity.

The acquisition of fish from leased ponds at Langdon, Kans., was greatly reduced owing to shortage of funds, and all work in this field was discontinued entirely at the close of the fiscal year.

The Mammoth Springs (Ark.) station was operated very efficiently at low cost and produced over 500,000 bass, rock bass, and bream.

A great improvement effected at the Louisville (Ky.) station was the replacement of the old electrical pumping system which had deteriorated to a point where it was very expensive to operate and was not dependable. Other improvements included painting and repairing of buildings and improvements to ponds. The output of fish was materially increased over the previous year. This station concentrates upon the smallmouth bass, it being one of the chief sources of supply for this species and 475,000 bass were distributed.

At the Warm Springs (Ga.) station general improvements were carried on. The output of fish was approximately of normal proportions.

At the Valdosta (Ga.) station, only a small output of fish was obtained because of the fact that the water supply could not be properly controlled. This establishment has many unusual features, and P. W. A. and C. W. A. funds were expended for improvements and developments which will give more adequate control of the available water supply and provide adequate drainage to wells.

The Fairport (Iowa) biological station was continued in operation for strictly fish-cultural purposes and enjoyed a successful season. Some rescue work was carried on in local waters by the station force.

The Crawford (Nebr.) station handling both trout and warm-water fish was able to provide additional pond space and effect other improvements while turning out a successful production of pond fish.

#### MISSISSIPPI RIVER TERRITORY

Diverse activities including fisheries administration in the Upper Mississippi Wild Life Refuge, rescue or salvage activities, propagation of trout and pond fish, and immediate supervision of the fish hatcheries at Lake Mills, Wis., and Rochester, Ind., come under the jurisdiction of the district supervisor located at the La Crosse (Wis.) station. At La Crosse, the trout culture was carried on successfully although there were temporary outbreaks of disease. A large number of trout were furnished for cooperative nurseries in Minnesota and Wisconsin. Another noteworthy accomplishment was the successful production of bass in a 5-acre pond located at the main station. This pond produced over 70,000 fingerling bass. Other semicontrolled ponds located in the refuge failed to be as productive owing to the fact that they were overflowed, and coarse or predatory fish gained access. Rescue activities have been discussed elsewhere in this report. The substations located at Marquette and Bellevue, Iowa, were operated by the Iowa Conservation Commission.

The Homer (Minn.) substation was utilized as a base for rescue operations, and also for the overhauling and maintenance of equipment, particularly boats, trucks, etc.

At Lake Mills, Wis., 7 new ponds were excavated having an area of 1 acre each and the necessary water pipe supply line laid. Other improvements were effected through the use of P. W. A. and C. W. A. allotments. A limited number of bass were produced in the ponds, but owing to lake conditions they were not in proper condition for fish cultural use. Trout culture was attempted, but the results were unsatisfactory owing to improper water supply apparently.

During the year active construction was under way at the new Rochester (Ind.) station, the work being performed successively under

P. W. A. allotment, C. W. A. assignment, and at the close of the year through the use of relief labor. The developments initiated consisted of two dwellings, a combination shop and garage, and a tank or holding house. In addition, the pond system was greatly extended. However, at the close of the year there still remained a considerable potential pond area awaiting development. Brood stock of pond fish was secured, and the hatch of fish appeared reasonably satisfactory in view of conditions. This station also achieved a distribution of bass and sunfish, during the fall of 1933, from the limited number of ponds which had been previously constructed and placed in operation. Assistance was rendered by the State of Indiana in the distribution of bass, sunfish, etc., produced at this station.

### AQUARIUM

The Bureau of Fisheries Aquarium has consistently increased in popularity and has become an important point of interest to visitors. During the school year classes in biology from Washington and adjacent territory have made frequent visits to it for educational purposes. There has been an insistent demand that the aquarium be kept open on Sundays and holidays in order to accommodate visitors who could not come at other times.

During the year 1,533 specimens of fish, comprising 62 species, and 107 aquatic animals of 6 varieties were on display. The trout collection, in particular, has been considered one of the finest in the country. Some difficulty has been encountered during the summer months in keeping the fish in good condition, owing to the high temperatures of the city water supply which caused the rapid development of parasites and the constant application of remedial measures. It has been the practice to make a special display of new and odd specimens which may be of unusual public interest.

Model hatching equipment, in a modified form, has been set up to demonstrate the methods followed in propagating trout, salmon, perch, shad, and wall-eyed pike.

The director has been called upon to furnish information and advice on the construction and maintenance of ornamental fish pools, home aquariums, etc., on frequent occasions.

### FISH CULTURAL NOTES

#### HATCHING SALMON EGGS ON STACKED TRAYS

There has previously been given considerable attention to the carrying of salmon fry on stacked trays in preference to use of the egg baskets. The report of a large-scale experiment of this nature at both the Big White and Little White Salmon (Oreg.) substations throws further light on this matter. One million nine hundred thousand eggs were hatched by this method. When the first indication of hatching appeared eggs were picked over and placed on stacked trays, each tray carrying 3,000 eggs. The resulting fry hatched on the trays were not cleaned up at any time during the sac absorption period, and it was found that the loss of fish handled in this manner was considerably less than with those handled in the usual way. The greatest loss was reported as being not to exceed 10 or 12 per tray of 3,000 eggs, and in many trays there was not a single dead fry.

The experiment was watched carefully to determine whether the shells disintegrated or would clog the screen and it was found that the shells had disappeared within a week after the eggs hatched. The benefits of this method are cited as being a reduction in the loss of fry and a marked curtailment of the work involved during the hatching season. It is pointed out, however, that at other hatcheries having a colder water temperature, the egg shells might not as readily disintegrate and the system would not work as well. The volume of water which was utilized was the same as that employed with the older method of using baskets.

#### DISCONTINUANCE OF FISH-CULTURAL NOTES

It has been decided to refrain from the further publication of items under the heading of Fish Cultural Notes in the divisional report. Since this is only issued annually, it is felt desirable that current fish cultural information be made more immediately available. With this object in view a monthly leaflet or bulletin entitled "The Progressive Fish Culturist" will be issued and circulated to the Bureau's employees and others interested. This will contain notes of recent current developments in fish culture, methods, technique, and practices. Developments and improvements in methods at the Bureau's stations, therefore, will be circulated so that they can be adopted elsewhere without waiting for a period of a year or more.

#### DISTRIBUTION OPERATIONS

The decrease in the output of fish was reflected in a curtailment of distribution activities both by the fish cars and by other means. The distribution cars made 71 trips in delivering fish and carried an average of 250 pails per trip. In making this distribution the cars traveled 38,134 paid miles and 10,348 free miles. Detached messengers made 74,516 paid and 15,762 free miles in delivering fish. The number of miles traveled by distribution cars was less than one-half that in 1933, while there was likewise a marked diminution in the travel by detached messengers and station trucks. During 1934, distribution by the latter means covered 38,526 miles. As heretofore, the Bureau was the beneficiary of transportation without cost or at reduced rates furnished by a number of railroads.

The modification in distribution policy necessitated by the curtailment of appropriations has resulted in a considerable number of unfilled applications, principally in sections at a distance from the points of production.

It has been the general policy to notify all applicants when fish are available for distribution, advising them that they will be expected to receive the fish at the hatchery or otherwise defray the costs of delivery. Detailed arrangements for such deliveries are made with the applicant directly by superintendents of the stations furnishing the fish, and are not handled by the Washington office. It is impracticable for the headquarters office to make definite and specific arrangements as to field deliveries owing to many conditions and circumstances which may arise. Where shipments to a given section can be consolidated, the cost of delivery to the individual applicant is kept at a low figure. After allowing adequate time for applicants to make arrangements for receiving the fish the balance of the season's

production is planted directly by the Bureau's employees in suitable waters within close proximity to the hatchery. The marked reduction in distribution costs has made it possible to keep in operation a number of hatcheries which would otherwise be closed because of shortage of funds.

*Summary, by species, of the distribution of fish, fiscal year 1934*

State and species	Number	State and species	Number
Alabama:		Iowa—Continued.	
Largemouth black bass.....	276,243	Carp.....	1,784,850
Crappie.....	600	Rainbow trout.....	149,955
Sunfish.....	183,625	Loch Leven trout.....	5,000
Alaska: Sockeye salmon.....	14,073,000	Brook trout.....	94,150
Arizona:		Pike and pickerel.....	55
Rainbow trout.....	10,000	Crappie.....	33,500
Loch Leven trout.....	929,580	Largemouth black bass.....	38,260
Arkansas:		Smallmouth black bass.....	18,000
Rainbow trout.....	8,300	Sunfish.....	33,515
Crappie.....	30	White basses.....	485
Largemouth black bass.....	205,580	Yellow perch.....	6,420
Smallmouth black bass.....	109,060	Miscellaneous fishes.....	9,300
Rock bass.....	600	Kansas:	
Sunfish.....	31,100	Rainbow trout.....	24,000
California:		Crappie.....	2,925
Chinook salmon.....	3,658,300	Largemouth black bass.....	47,780
Rainbow trout.....	125,000	Rock bass.....	800
Brook trout.....	25,000	Sunfish.....	2,080
Colorado:		Yellow perch.....	1,200
Steelhead salmon.....	50,000	Kentucky:	
Rainbow trout.....	1,598,490	Rainbow trout.....	10,500
Black-spotted trout.....	379,400	Largemouth black bass.....	155,310
Loch Leven trout.....	2,681,980	Smallmouth black bass.....	183,003
Lake trout.....	14,000	Rock bass.....	2,825
Brook trout.....	7,583,029	Sunfish.....	23,900
Connecticut:		Louisiana:	
Brook trout.....	1,000	Largemouth black bass.....	45,538
Loch Leven trout.....	100,360	Warmouth bass.....	12,350
Smallmouth black bass.....	377,000	Sunfish.....	331,140
Delaware: Largemouth black bass.....	300	Maine:	
Florida:		Atlantic salmon.....	20,890
Largemouth black bass.....	6,010	Landlocked salmon.....	368,720
Sunfish.....	380	Lake trout.....	500,100
Georgia:		Brook trout.....	2,509,410
Catfish.....	600	Smallmouth black bass.....	18,000
Rainbow trout.....	601,745	Cod.....	1,037,292,000
Loch Leven trout.....	151,320	Haddock.....	191,754,000
Brook trout.....	76,100	Winter flounder.....	809,811,000
Largemouth black bass.....	312,680	Maryland:	
Crappie.....	180	Rainbow trout.....	12,203
Sunfish.....	245,995	Loch Leven trout.....	7,550
Yellow perch.....	375	Brook trout.....	16,500
Idaho:		Crappie.....	100
Catfish.....	60	Largemouth black bass.....	15,951
Chinook salmon.....	159,250	Smallmouth black bass.....	16,500
Steelhead salmon.....	127,000	Sunfish.....	11,200
Rainbow trout.....	2,792,640	Massachusetts:	
Black-spotted trout.....	5,211,020	Rainbow trout.....	202,500
Loch Leven trout.....	100,000	Brook trout.....	202,350
Brook trout.....	60,000	Mackerel.....	2,916,000
Smallmouth black bass.....	2,400	Smallmouth black bass.....	24,316
Illinois:		Winter flounder.....	127,549,246
Catfish.....	1,430	Michigan:	
Crappie.....	3,980	Catfish.....	244
Largemouth black bass.....	9,450	Whitefish.....	430,000
Smallmouth black bass.....	900	Steelhead salmon.....	97,745
Sunfish.....	3,240	Rainbow trout.....	192,000
Indiana:		Loch Leven trout.....	46,665
Catfish.....	600	Lake trout.....	926,500
Rainbow trout.....	28,000	Brook trout.....	597,400
Loch Leven trout.....	21,800	Crappie.....	3,200
Brook trout.....	27,500	Largemouth black bass.....	24,895
Crappie.....	2,985	Smallmouth black bass.....	42,950
Largemouth black bass.....	124,825	Sunfish.....	3,645
Smallmouth black bass.....	23,200	Yellow perch.....	700
Rock bass.....	150	Minnesota:	
Sunfish.....	6,307	Catfish.....	3,850,520
Yellow perch.....	3,200	Buffalofish.....	113,350
Iowa:		Carp.....	1,717,905
Catfish.....	231,150	Rainbow trout.....	59,100
Buffalofish.....	42,600	Loch Leven trout.....	133,200

1 All buffalofish and carp shown in above table are planted in commercial areas of the Mississippi River.

## Summary, by species, of the distribution of fish, fiscal year 1934—Continued

State and species	Number	State and species	Number
<b>Minnesota—Continued.</b>		<b>New York—Continued.</b>	
Brook trout.....	201, 100	Smallmouth black bass.....	134, 515
Pike and pickerel.....	60, 100	Sunfish.....	1, 830
Crappie.....	8, 653, 213	<b>North Carolina:</b>	
Largemouth black bass.....	830, 345	Catfish.....	3, 036
Smallmouth black bass.....	1, 012	Shad.....	3, 500, 000
Sunfish.....	1, 556, 770	Rainbow trout.....	313, 040
Pike perch.....	6, 600, 000	Brook trout.....	150, 500
Yellow perch.....	1, 908, 480	Crappie.....	3, 480
White bass.....	13, 550	Largemouth black bass.....	182, 238
Fresh-water drum.....	6, 580	Sunfish.....	25, 045
Miscellaneous fishes.....	2, 331, 600	Yellow perch.....	3, 900, 075
<b>Mississippi:</b>		White perch.....	900, 000
Crappie.....	2, 800	<b>North Dakota: Rainbow trout.....</b>	<b>14, 000</b>
Rainbow trout.....	5, 000	<b>Ohio:</b>	
Largemouth black bass.....	211, 833	Catfish.....	5, 200
Sunfish.....	189, 350	Whitefish.....	8, 850, 000
<b>Missouri:</b>		Rainbow trout.....	72, 500
Catfish.....	1, 460	Loch Leven trout.....	66, 950
Rainbow trout.....	23, 830	Brook trout.....	2, 150
Crappie.....	12, 685	Crappie.....	820
Largemouth black bass.....	234, 660	Largemouth black bass.....	18, 310
Smallmouth black bass.....	58, 740	Smallmouth black bass.....	57, 150
Rock bass.....	6, 020	Sunfish.....	6, 165
Sunfish.....	31, 390	Pike perch.....	830, 025, 000
Yellow perch.....	960	<b>Oklahoma:</b>	
<b>Montana:</b>		Catfish.....	2, 700
Catfish.....	9, 326	Rainbow trout.....	1, 686
Rainbow trout.....	983, 050	Crappie.....	25, 050
Black-spotted trout.....	1, 758, 337	Largemouth black bass.....	50, 932
Loch Leven trout.....	5, 416, 360	Rock bass.....	25
Brook trout.....	92, 310	Warmouth bass.....	102
Crappie.....	18, 231	Sunfish.....	57, 205
Largemouth black bass.....	22, 889	Yellow perch.....	1, 866
Sunfish.....	73, 455	<b>Oregon:</b>	
Yellow perch.....	73, 997	Chinook salmon.....	9, 527, 176
Miscellaneous fishes.....	28, 239	Silver salmon.....	571, 575
<b>Nebraska:</b>		Steelhead salmon.....	316, 230
Catfish.....	59, 000	Rainbow trout.....	489, 000
Rainbow trout.....	769, 875	Black-spotted trout.....	3, 520, 240
Loch Leven trout.....	237, 800	Loch Leven trout.....	640, 050
Brook trout.....	161, 500	Brook trout.....	560, 000
Crappie.....	2, 650	<b>Pennsylvania:</b>	
Largemouth black bass.....	59, 870	Catfish.....	60
Sunfish.....	2, 880	Rainbow trout.....	352, 100
<b>Nevada:</b>		Loch Leven trout.....	214, 300
Rainbow trout.....	10, 000	Brook trout.....	1, 055, 018
Black-spotted trout.....	400, 000	Largemouth black bass.....	2, 200
<b>New Hampshire:</b>		Sunfish.....	2, 135
Landlocked salmon.....	12, 600	<b>South Carolina:</b>	
Rainbow trout.....	172, 100	Catfish.....	3, 628
Lake trout.....	32, 500	Shad.....	1, 624, 000
Brook trout.....	3, 211, 819	Rainbow trout.....	571, 000
Smallmouth black bass.....	38, 360	Loch Leven trout.....	4, 000
<b>New Jersey:</b>		Brook trout.....	44, 625
Rainbow trout.....	2, 000	Crappie.....	92
Loch Leven trout.....	800	Largemouth black bass.....	185, 206
Brook trout.....	2, 000	Warmouth bass.....	350
Largemouth black bass.....	1, 120	Sunfish.....	83, 782
Sunfish.....	360	Yellow perch.....	3, 025
<b>New Mexico:</b>		<b>South Dakota:</b>	
Catfish.....	5, 900	Catfish.....	43, 200
Rainbow trout.....	1, 651, 000	Rainbow trout.....	736, 510
Black-spotted trout.....	3, 325, 000	Loch Leven trout.....	1, 599, 215
Loch Leven trout.....	1, 020, 000	Brook trout.....	725, 270
Brook trout.....	132, 500	Crappie.....	1, 500
Largemouth black bass.....	528, 700	Largemouth black bass.....	25, 150
Sunfish.....	36, 400	Sunfish.....	2, 800
<b>New York:</b>		Yellow perch.....	850
Landlocked salmon.....	2, 000	<b>Tennessee:</b>	
Rainbow trout.....	101, 391	Catfish.....	1, 040
Black-spotted trout.....	970	Rainbow trout.....	891, 040
Loch Leven trout.....	37, 850	Loch Leven trout.....	49, 500
Lake trout.....	42, 428	Brook trout.....	86, 650
Brook trout.....	255, 375	Largemouth black bass.....	48, 530
Largemouth black bass.....	5, 216	Smallmouth black bass.....	430



*Summary, by species, of the distribution of fish, fiscal year 1934.—Continued*

State and species	Number	State and species	Number
<b>Tennessee—Continued.</b>		<b>Washington—Continued.</b>	
Rock bass.....	18,400	Rainbow trout.....	163,300
Sunfish.....	34,295	Black-spotted trout.....	1,372,415
Yellow perch.....	35	Loch Leven trout.....	596,130
<b>Texas:</b>		Brook trout.....	1,079,470
Catfish.....	7,180	Crappie.....	3,032
Crappie.....	17,381	Largemouth black bass.....	6,200
Largemouth black bass.....	642,925	Sunfish.....	22,150
Warmouth bass.....	800	Yellow perch.....	8,516
Sunfish.....	131,725	<b>West Virginia:</b>	
Rio Grande perch.....	8,840	Catfish.....	2,400
<b>Utah:</b>		Rainbow trout.....	609,948
Whitefish.....	400,000	Loch Leven trout.....	16,100
Landlocked salmon.....	44,290	Brook trout.....	1,109,564
Rainbow trout.....	1,630,108	Crappie.....	350
Black-spotted trout.....	317,000	Largemouth black bass.....	8,425
Loch Leven trout.....	1,463,076	Smallmouth black bass.....	60,670
Brook trout.....	1,085,900	Sunfish.....	761
Largemouth black bass.....	5,039	<b>Wisconsin:</b>	
<b>Vermont:</b>		Catfish.....	3,470,966
Atlantic salmon.....	14,800	Buffalofish.....	1,772,430
Landlocked salmon.....	79,725	Carp.....	1,002,942
Rainbow trout.....	40,375	Rainbow trout.....	252,600
Loch Leven trout.....	8,500	Loch Leven trout.....	387,400
Lake trout.....	26,000	Brook trout.....	644,000
Brook trout.....	2,963,997	Pike and pickerel.....	64,855
Smallmouth black bass.....	58,100	Crappie.....	8,930,300
<b>Virginia:</b>		Largemouth black bass.....	986,120
Shad.....	6,450,000	Smallmouth black bass.....	17,540
Rainbow trout.....	305,928	Sunfish.....	1,894,740
Loch Leven trout.....	8,180	Yellow perch.....	1,926,995
Brook trout.....	194,200	White bass.....	18,450
Crappie.....	975	Fresh-water drum.....	6,580
Largemouth black bass.....	52,026	Miscellaneous fishes.....	2,683,700
Smallmouth black bass.....	2,505	<b>Wyoming:</b>	
Rock bass.....	26,983	Catfish.....	123,900
Sunfish.....	96,640	Rainbow trout.....	1,501,660
Yellow perch.....	100,000	Black-spotted trout.....	15,249,515
<b>Washington:</b>		Loch Leven trout.....	2,754,821
Catfish.....	2,000	Brook trout.....	1,613,705
Chinook salmon.....	13,972,000	Grayling.....	5,240,320
Chum salmon.....	11,857,500	Crappie.....	7,800
Silver salmon.....	1,960,850	Largemouth black bass.....	105,430
Sockeye salmon.....	9,521,141	Rock bass.....	550
Humpback salmon.....	138,675	Sunfish.....	8,125
Steelhead salmon.....	1,516,500	Yellow perch.....	54,550

<sup>1</sup> All buffalofish and carp shown in above table are planted in commercial areas of the Mississippi River.







MBL WHOI LIBRARY



WH 1AJB 4

